SysLINK

Administrator's

Guide

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Chapter 1: Introduction

The Systech family of SysLINK devices enables secure communication among a wide variety of wired and wireless devices and Internet connectivity via Wi-Fi, Ethernet, and cellular connections. Key applications include secure cellular and Internet access for ATM payment processing; vending machine telemetry and payment processing; POS payment processing and internet connectivity; remote information display; and kiosk internet connectivity. The SysLINK family also supports home and building security and automation applications, and mobile health.

The SysLINK gateway family provides communication between a variety of local devices and computers connected to a network – either a private network or the Internet. Local devices may have dial, serial, Ethernet, or wireless (Wi-Fi, Zigbee, Z-Wave, or Bluetooth) interfaces. The connection to network may be Ethernet, Cellular, Wi-Fi or dial.

When a SysLINK unit is connected to your LAN and to one or more devices, it manages device traffic over the network, routing it to/from the correct host. The SysLINK may have terminal (phone line) ports and/or serial ports that emulate external modems.

As system administrator, you will have responsibility for setting up and configuring the gateway to meet your usage requirements. The gateway has been designed to make your job easy. The hardware is simple to install, and a browser interface ensures that management is just as simple. In addition to configuration tools, the communications server provides tools for monitoring and managing your port activity and for diagnosing and troubleshooting system problems.

Chapter 2: Configuration

Gateway Configuration

Before configuring the gateway, it must obtain an IP address as described below. After it has an IP address, the gateway is configured primarily through the web browser interface.

Setting the IP Address

The factory default configuration for the gateway typically has no IP address. To use the gateway you must assign it an IP address. There are several ways to do this. When the gateway has a good IP address (that is, not temporary), the status light will blink green.

DHCP/BOOTP

If the gateway does not have an IP address, or if it obtained a temporary one via the method described below, it will attempt to get one from a DHCP/BOOTP server on the local network. If an IP address is obtained from a DHCP server, the gateway will also ask the DHCP server for a subnet mask, a default gateway, an NTP time-server, and a DNS name and server.

Port Server Utility

You can use the Systech Port Server Utility, or NCCTool to assign an IP address to your gateway. Once you have done this, DHCP/BOOTP is disabled. The Port Server Utility always uses the default subnet mask for the given IP address class. If you are subnetting your network, the NCCTool allows you to override the default subnet mask.

How to Use the Ports

The gateway terminal port(s) can be used to:

- Accept dialed phone connections and turn them into TCP/IP network connections to remote hosts (outgoing connections) optionally using SSL security
- Accept TCP/IP network connections from remote hosts (incoming connections) and make a phone connection to an attached device.

The gateway serial port(s) can be used to:

- Emulate a dial-up modem connection over TCP/IP (via **Modem Emulation**) optionally using SSL security
- Initiate TCP/IP network connections to remote hosts (outgoing connections) optionally using SSL security
- Accept TCP/IP network connections from remote hosts (incoming connections)

The following sections describe each of these configurations in more detail.

You will need to configure the desired service and set up the proper serial parameters for your device. For more information on configuring the serial settings, see the section entitled **Serial Settings**.

Configuring Dial to IP on Terminal Ports

The gateway terminal ports can be configured to accept an incoming phone call, answer it with it's internal modem, initiate a TCP connection to a remote host, and then route all data over this connection. This connection is configured to match the protocol required by the host. It is generally used to connect a terminal with a built-in modem to a network-based host.

To configure a terminal port for outgoing TCP network connections:

1. Configure the correct parameters for the terminal port (see **Serial Settings**)
2. Configure phone number to host/port pair translation (see **Phone Number Translation**)
3. Configure the protocol to use for the target host (see **Protocol Settings**)

Configuring Modem Emulation on a Serial Port

The gateway can be configured to allow legacy devices that interact with external modems to communicate over a TCP/IP network instead of a phone line. When modem emulation is enabled, the gateway will respond to AT commands generated by the attached device. After receiving the dial command, the gateway will make a TCP connection to the specified host, optionally translating the phone number into a TCP host and port. The gateway will also accept incoming TCP/IP connections and generate the appropriate response codes. Each Systech serial port accepts incoming TCP connections on two TCP ports: an 8000-series port (for raw data), and a 9000-series port (for telnet data).

To enable modem emulation:

1. Configure the correct serial parameters on the serial port (see **Serial Settings**)
2. Enable modem emulation (see **Port Services**)
3. Optionally configure phone number to host/port pair translation (see **Phone Number Translation**)
4. Configure connection protocols for the target host(s) (see **Protocol Settings**)

Once modem emulation is enabled, verify correct operation by connecting a terminal to the appropriate serial port and issuing an 'AT' command. If the gateway returns the 'OK' result code, modem emulation is now functioning properly. You may now establish an outgoing connection with the 'ATD' command (see **Phone Numbers** for more information on IP address formats).

Configuring Outgoing Network Connections on a Serial Port

The gateway can be configured to initiate TCP connections to remote hosts from a serial port. This connection can be configured for a variety of host protocols. It is generally used when the gateway must initiate the network connection to the remote host.

This option can provide telnet logins for terminals attached to the gateway, or it can establish raw data paths for other serial devices. To configure a port for outgoing TCP network connections:

1. Configure the correct serial parameters on the serial port (see **Serial Settings**)
2. Configure the desired TCP protocol parameters (see **Port Services)**
3. Configure connection protocols for the target host(s) (see **Protocol Settings**)

Configuring Incoming Network Connections via Telnet Server

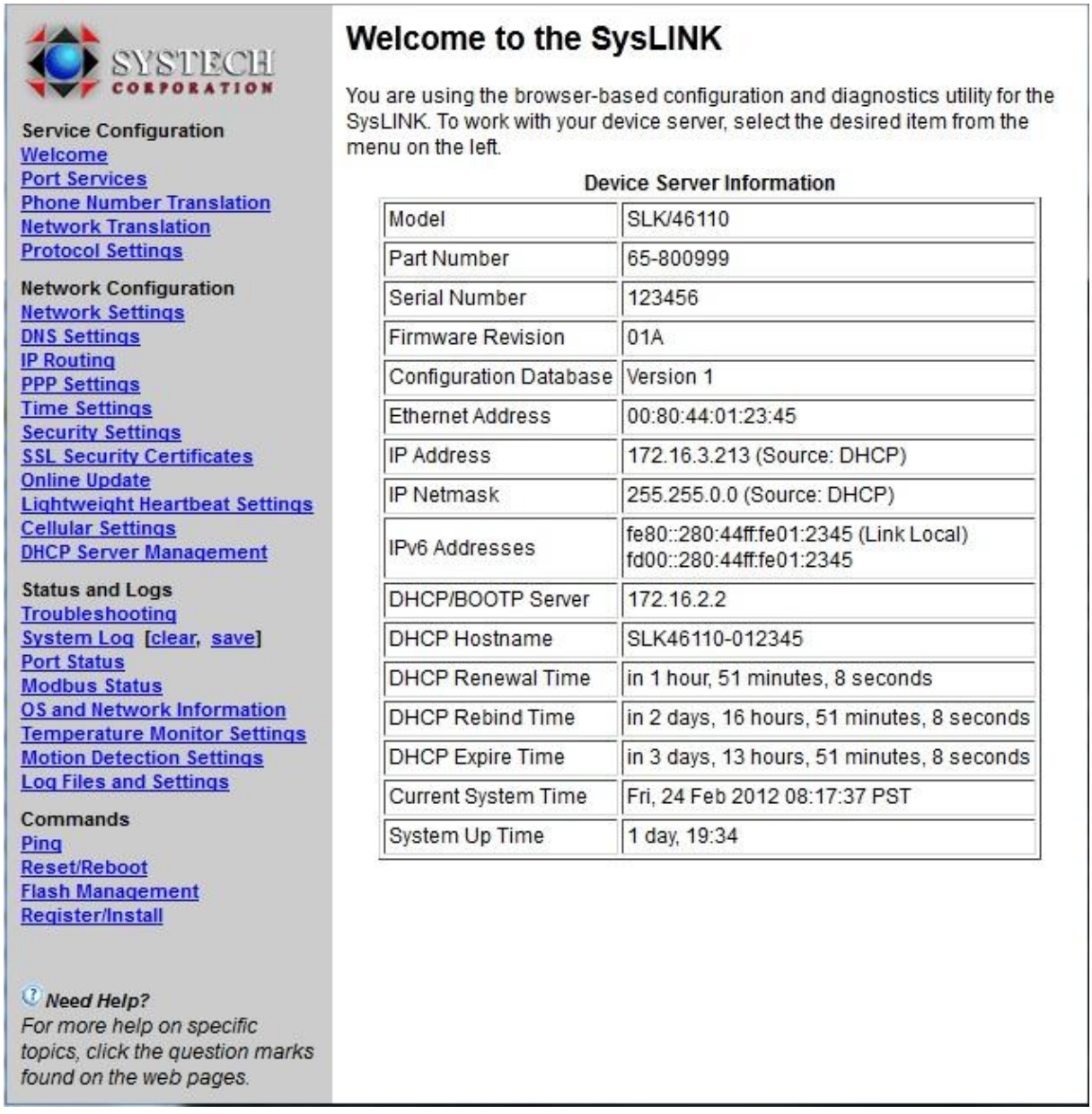
The gateway is pre-configured to accept incoming TCP connections from TCP socket-based applications. Each Systech serial port accepts incoming TCP connections on two TCP ports: an 8000-series port (for raw data), and a 9000-series port (for telnet data).

The 8000-series port (8001 for port 1, or 800N for port N) is a raw data path that passes all data back and forth between the network and the serial device without further processing. It should be used by applications that support simple TCP connections and do not implement the telnet protocol. There is no protocol involved beyond TCP/IP.

The 9000-series port (9001 for port 1, or 900N for port N) implements the telnet protocol and supports the following telnet options: SUPPRESS GOAHEAD, BINARY, ECHO, COM-PORT-OPTION and TIMING MARK. It should be used by the Systech NativeCOM driver, and by other applications that support telnet.

Configuration via the Web Browser Interface

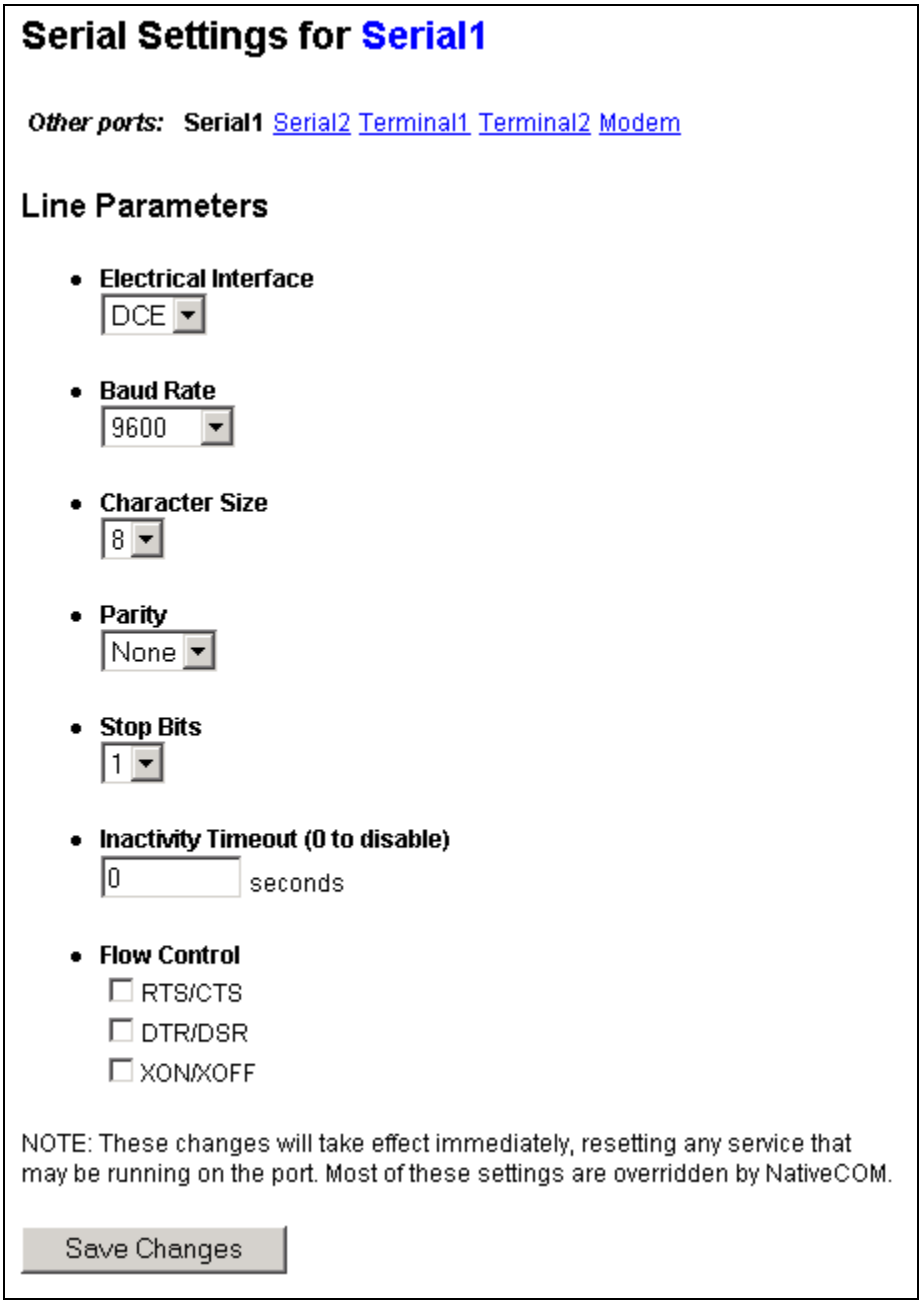
Once the gateway has an IP address, you can use a web browser to monitor and configure it. Simply specify the IP address of the gateway as the address or URL in your browser and you will see a web page that is similar to the following:


SYSTECH CORPORATION
Service Configuration
Welcome
Port Services
Phone Number Translation
Network Translation
Protocol Settings
Network Configuration
Network Settings
DNS Settings
IP Routing
PPP Settings
Time Settings
Security Settings
SSL Security Certificates
Online Update
Lightweight Heartbeat Settings
Cellular Settings
DHCP Server Management
Status and Logs
Troubleshooting
System Log [clear, save]
Port Status
Modbus Status
OS and Network Information
Temperature Monitor Settings
Motion Detection Settings
Log Files and Settings
Commands
Ping
Reset/Reboot
Flash Management
Register/Install
Need Help?
For more help on specific topics, click the question marks found on the web pages.
Welcome to the SysLINK
You are using the browser-based configuration and diagnostics utility for the SysLINK. To work with your device server, select the desired item from the menu on the left.
Device Server Information
Model SLK/46110
Part Number 65-800999
Serial Number 123456
Firmware Revision 01A
Configuration Database Version 1
Ethernet Address 00:80:44:01:23:45
IP Address 172.16.3.213 (Source: DHCP)
IP Netmask 255.255.0.0 (Source: DHCP)
IPv6 Addresses fe80::280:44ff:fe01:2345 (Link Local) fd00::280:44ff:fe01:2345
DHCP/BOOTP Server 172.16.2.2
DHCP Hostname SLK46110-012345
DHCP Renewal Time in 1 hour, 51 minutes, 8 seconds
DHCP Rebind Time in 2 days, 16 hours, 51 minutes, 8 seconds
DHCP Expire Time in 3 days, 13 hours, 51 minutes, 8 seconds
Current System Time Fri, 24 Feb 2012 08:17:37 PST
System Up Time 1 day, 19:34

Select the section you wish to access from the menu of links on the left side. The following pages discuss each of these sections.

Serial Settings

The **Serial Settings** page allows you to specify the baud rate, character size, parity, stop bits, and flow control behavior for each serial port:



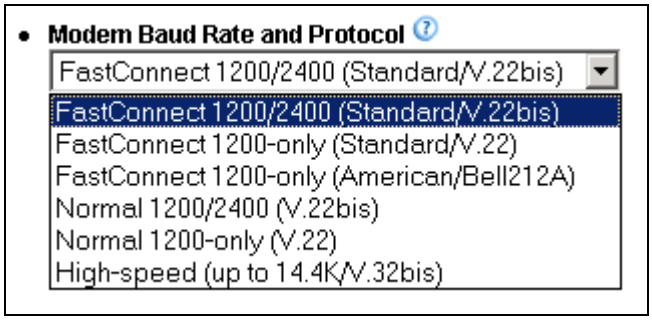
NOTE: an RFC-2217 telnet client with COM-PORT-OPTION support overrides these parameters.

Enabling flow control enables it on both input and output.

The default port settings are as shown above.

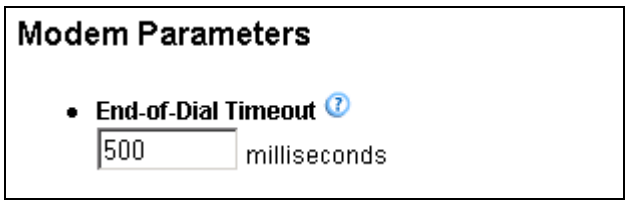
Refer to the SysLINK Hardware Manual for the effect of the DCE/DTE settings on serial port pinouts.

For Terminal and Modem ports, the Baud Rate choices also include the modem protocols.



FastConnect reduces the modem connection time by skipping some of the modem negotiation. If your attached device is designed to connect at 1200 or 2400 you may often use FastConnect to speed up the negotiation. The High-Speed option is only available on the dial-backup modem.

Also for Terminal and Modem ports, the following may be configured:



The gateway detects the completion of an incoming dialed number on the Terminal ports when the digits stop coming in. Set the end-of-dial timeout larger than the maximum time between dialed digits. Many modems dial with about 70-100 msecs between digits, so a value of 120-150 works well. The timeout applies to the second and subsequent digits. The gateway waits a little over 2 seconds for the first digit to timeout to allow for external access digits (such as 9,1-800…). You may disable this by specifying 0 for the timeout. This will allow single digit dialing.

Port Services

By default, all ports are configured to accept incoming TCP connections from TCP/telnet clients and no outgoing service is configured. You may configure the ports to initiate outgoing raw TCP (with or without SSL) or telnet connections to remote servers. In addition, the modem emulation feature may be enabled to allow a serial port to mimic a modem interface.

A note about port naming and numbering: the gateway ports are labeled "POS Serial" (1 and 2), "POS Terminal" (1, 2, 3 and 4), and "Modem". In this manual and in the web configuration screens the ports are referred to as Serial1, Serial2, Terminal1, Terminal2, Terminal3, Terminal4 and Modem. For incoming connections, the ports are numbered as follows:

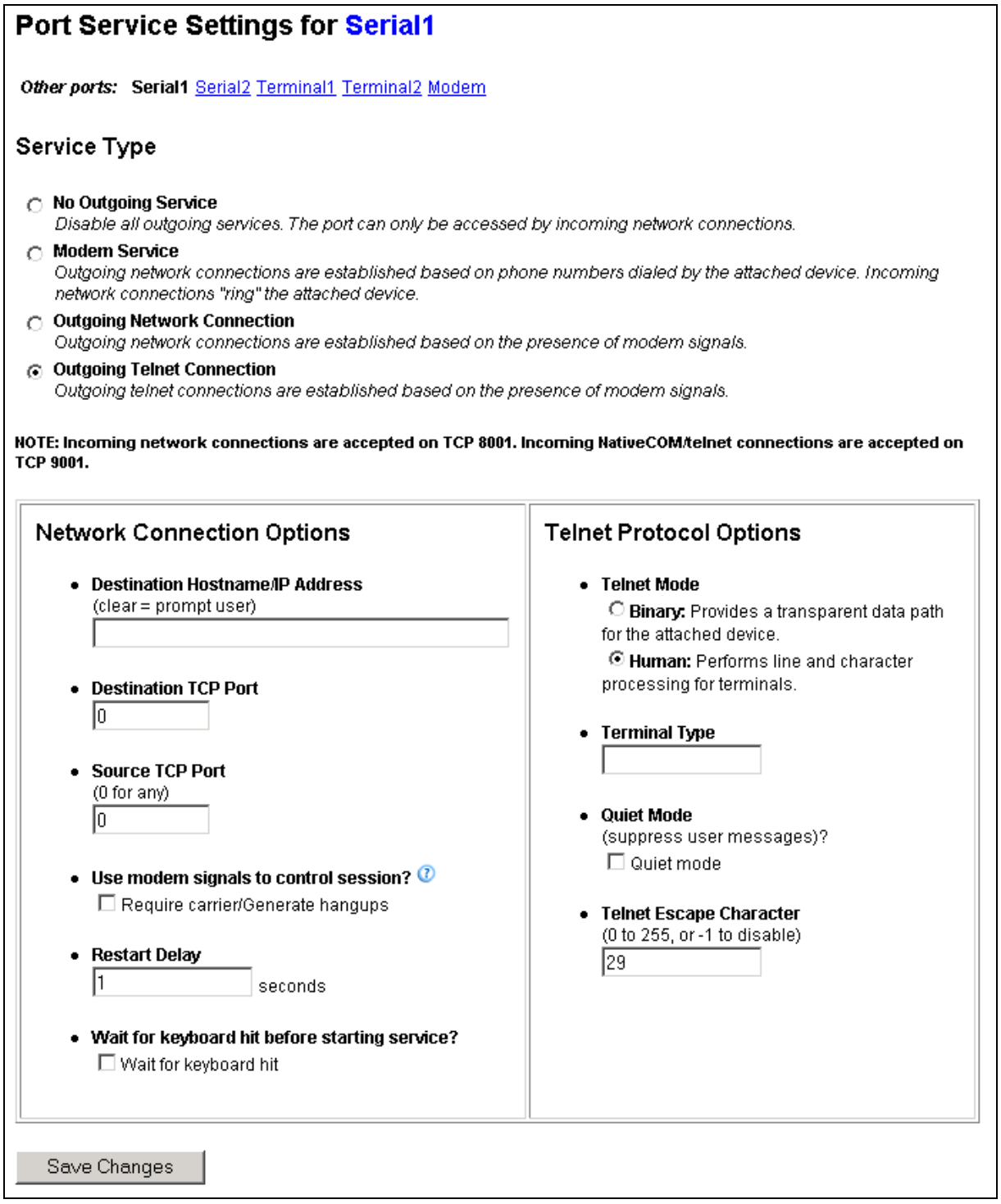
Port	Incoming Telnet Port	Raw TCP Port
Serial1	9001	8001
Serial2	9002	8002
Terminal1	9003	8003
Terminal2	9004	8004
Terminal3	9005	8005
Terminal4	9006	8006
Modem	9007	8007

When using the modem service on a port, the phone number will be translated to a host/port pair then a TCP connection will be established to the remote host.

When using outgoing connections on a port, the settings configured on the **Serial Settings** page will be applied to the port, and a TCP connection will be established to the remote host. If **Require carrier/Generate hangups** is set, the service will wait for the presence of the DCD modem signal before connecting.

Once connected, data received on the port is sent to the remote server over the network connection and data received on the network connection is sent out the port.

The following screen shot represents most of the options available for configuration. Depending on the Service Type you have selected, not all of these options will be displayed.


Port Service Settings for Serial1
Other ports: Serial1 Serial2 Terminal1 Terminal2 Modem
Service Type
No Outgoing Service
Disable all outgoing services. The port can only be accessed by incoming network connections.
Modem Service
Outgoing network connections are established based on phone numbers dialed by the attached device. Incoming network connections "ring" the attached device.
Outgoing Network Connection
Outgoing network connections are established based on the presence of modem signals.
Outgoing Telnet Connection
Outgoing telnet connections are established based on the presence of modem signals.
NOTE: Incoming network connections are accepted on TCP 8001. Incoming NativeCOM/telnet connections are accepted on TCP 9001.
Network Connection Options
Destination Hostname/IP Address
(clear = prompt user)
Destination TCP Port
0
Source TCP Port
(0 for any)
0
Use modem signals to control session?
Require carrier/Generate hangups
Restart Delay
1
seconds
Wait for keyboard hit before starting service?
Wait for keyboard hit
Telnet Protocol Options
Telnet Mode
Binary: Provides a transparent data path for the attached device.
Human: Performs line and character processing for terminals.
Terminal Type
Quiet Mode
(suppress user messages)?
Quiet mode
Telnet Escape Character
(0 to 255, or -1 to disable)
29
Save Changes

Service Types

No Outgoing Service

Selecting this option disables outgoing port services on the specified port. Incoming connections are still allowed. All Port Services options will reset to defaults.

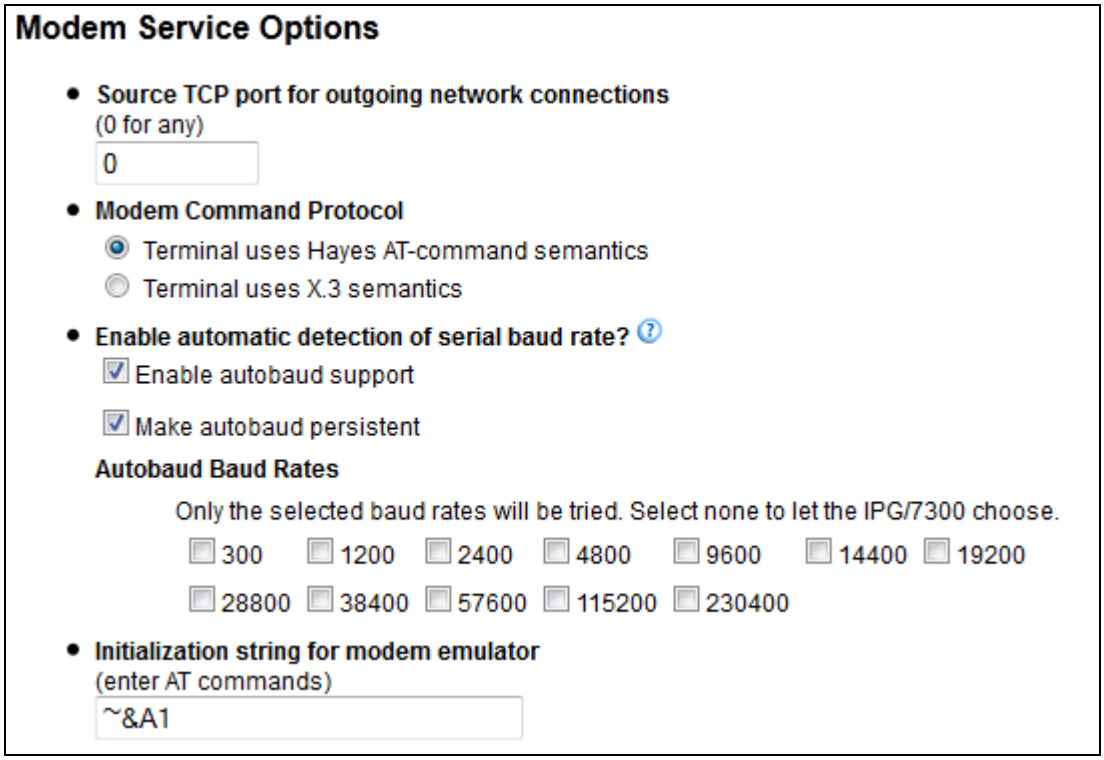
Modem Service

Selecting this option on a Terminal (phone line) port will enable phone number translation on that port.

Selecting this option on a serial port will enable modem emulation on both the incoming and outgoing network connections. See **Modem Emulation** for details on commands and responses.

In both cases, the target peer (specified in the **Phone Number Translation** table and configured in the **Protocol Settings** page) determines the type of outgoing connection that will be made.

When Modem Service is selected, you may also configure the **Source TCP Port** (see below) and enable or disable automatically detecting the serial baud rate.


Modem Service Options
Source TCP port for outgoing network connections
(0 for any)
0
Modem Command Protocol
Terminal uses Hayes AT-command semantics
Terminal uses X.3 semantics
Enable automatic detection of serial baud rate?
Enable autobaud support
Make autobaud persistent
Autobaud Baud Rates
Only the selected baud rates will be tried. Select none to let the IPG/7300 choose.
300 1200 2400 4800 9600 14400 19200
28800 38400 57600 115200 230400
Initialization string for modem emulator
(enter AT commands)
~&A1

The gateway's Modem Emulation service on a serial port has the ability to automatically detect when the baud rate of the attached device is different from the one configured on the gateway serial port. In many cases, it is possible to guess the speed of the attached device and to automatically switch the serial port to match that speed.

In some instances this functionality can cause inappropriate baud rate changes to be made that will cause communications to break down. Two additional settings may help prevent inappropriate changes: "Make autobaud persistent" and "Autobaud Baud Rates"

Checking "Make autobaud persistent" causes the SysLINK to lock in the baud rate once it has successfully detected it.

"Autobaud Baud Rates" allow you to limit the baud rates that the SysLINK will cycle between during autobaud detection. This is particularly useful if you know that a device uses a limited set of baud rates but may change between them during normal operation.

Outgoing Network Connection

Selecting this option enables an outgoing connection to the specified host. The **Network Connection Options** (below) identify the host.

Outgoing Telnet Connection

Selecting this option enables an outgoing telnet connection to the specified host. The **Network Connection Options** identify the host and the

Telnet Options (below) configure the specific type of telnet connection.

Network Connection Options

Destination Hostname/IP Address

Specify the IP address or Host name of the remote host in the **Destination IP Address** field.

Destination TCP Port

Specify the destination TCP port. The default port for telnet servers is 23, but it is usually different for other types of servers.

Source TCP Port

In most cases, the value used for the source port is arbitrary and you can leave this field set to 0 for "any". However, if your server or firewall has specific requirements you may specify an explicit source port number in the **Source TCP Port** field. If this port is not available when the TCP service starts up, an error will occur and the TCP service will reset and try again.

Require carrier/Generate hangups

If you have configured a serial port with an outgoing service, you may want to delay the TCP connection establishment until an attached terminal is powered up or an attached dial-in modem has received a call. In this case, select the **Require carrier/Generate hangups** option. The TCP session will not begin until the gateway senses the presence of DTR (in DCE mode) or DCD (in DTE mode) on the port and it will close the TCP session if DTR/DCD is lost.

Telnet clients usually do not want the operation of the port to be affected by the presence, absence, or loss of modem signals. You probably do not want this option selected for those applications.

Restart Delay

The **Restart Delay** keeps the TCP service from constantly retrying if the remote host becomes unavailable, or in the event of network errors or other unexpected situations.

When the TCP session ends, it will pause for the number of seconds specified by the **Restart Delay**. The default value (and minimum value) for the **Restart Delay** is 1 second.

Wait for Keyboard Hit

You may configure the TCP connection to wait for a "keyboard hit" before starting the TCP session. Enabling this mode will display a message on the serial port (after DCD is present if DCD is required to use the port) asking the user to type a character to begin the TCP session.

Telnet Options

The following options apply only if an Outgoing Telnet Connection is configured.

Telnet Mode

The TCP service can connect to a server using the telnet protocol in either Binary mode (8-bit) or Human mode (7 bit, performs line and character processing for terminals). The telnet client will negotiate telnet parameters with the remote telnet server. The parameters that it will request are as follows:

- **Binary mode:** DO BINARY, WILL BINARY
- **Human mode:** DO SUPPRESS GOAHEAD, WILL SUPPRESS GOAHEAD

The gateway also supports the following telnet modes if negotiated by the remote telnet server: ECHO, COM-PORT-OPTION, TERMINAL-TYPE, and TIMING MARK. (Note that the gateway does not support local echo. However, it will accept a WILL ECHO request for remote echoing and will respond with DO ECHO.)

Terminal Type

If the remote host requests the DO-TERMINAL-TYPE telnet option, and the **Terminal Type** field is configured, the gateway will respond with this value. This field is useful when you are connecting serial terminals to the gateway and the remote host needs to know how to format output to the terminal. Otherwise, you can leave this blank.

Quiet Mode

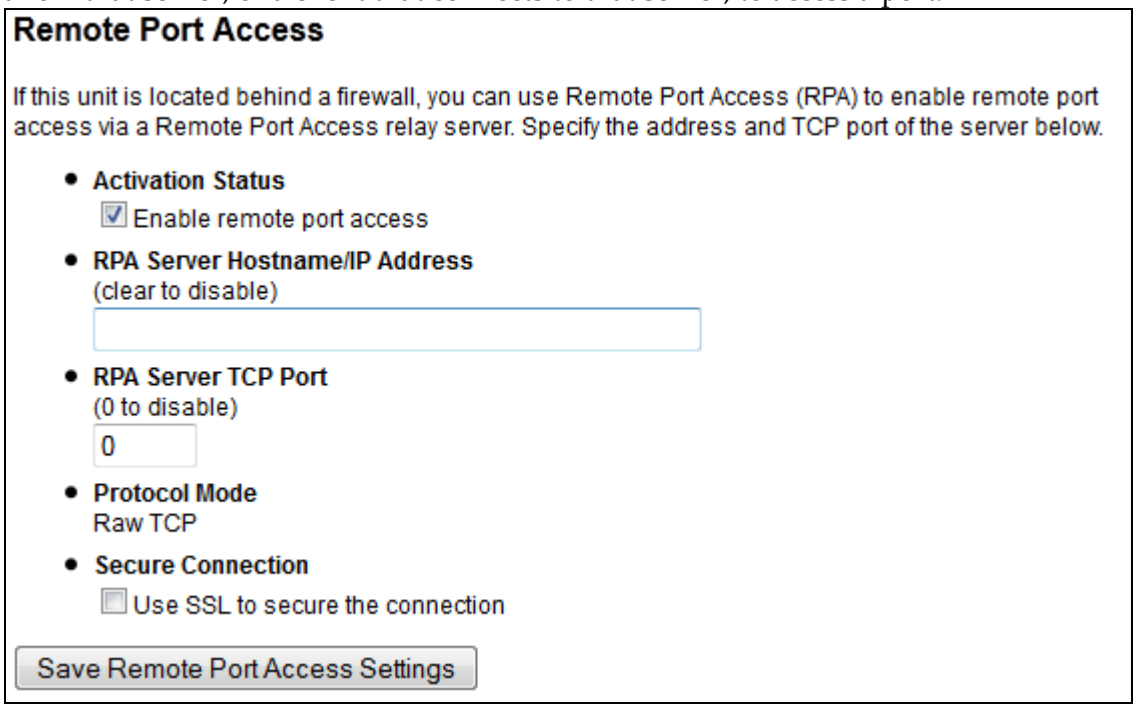
By default, the telnet session will display various status messages as it makes, loses, or breaks connections to the remote server. Selecting **Quiet Mode** will suppress these messages. This is useful when using serial devices that may be confused by these status messages.

Telnet Escape Character

When the telnet client is in the 7-bit "Telnet mode", it parses serial input for a special escape character. The default escape character is "CTRL-]" (or ASCII 29). If it sees this character, it breaks into the telnet command mode and displays a command prompt that allows the user to execute some telnet session commands. You may specify a different character (as decimal ASCII) to use as the **Telnet Escape Character**, or specify -1 to disable this feature entirely.

Remote Port Access

Remote Port Access (RPA) allows a unit to make an outbound connection to a server to allow that server, or a client that connects to that server, to access a port.

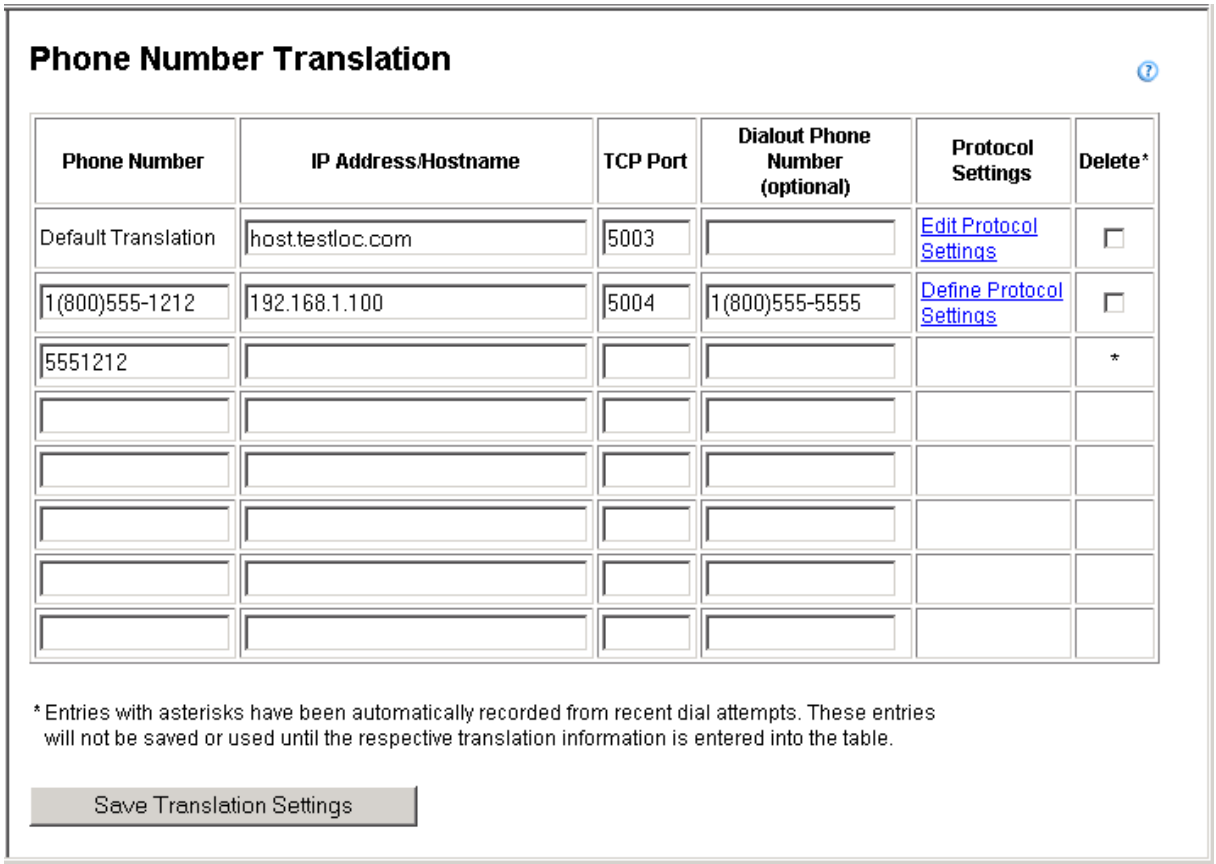

Remote Port Access
If this unit is located behind a firewall, you can use Remote Port Access (RPA) to enable remote port access via a Remote Port Access relay server. Specify the address and TCP port of the server below.
Activation Status
Enable remote port access
RPA Server Hostname/IP Address
(clear to disable)
RPA Server TCP Port
(0 to disable)
0
Protocol Mode
Raw TCP
Secure Connection
Use SSL to secure the connection
Save Remote Port Access Settings

You may define RPA service on a port but not enable it. Then use LWHB to enable RPA dynamically.

Phone Number Translation

This table can be used to translate phone numbers into IP addresses or Hostnames. If an attached device dials one of the specified telephone numbers, the corresponding IP address and port are used to make the TCP connection. Note that all non-numeric characters except the "," (comma) in the phone number are ignored.

Terminal ports detect the dialed numbers from the DTMF tones generated by the attached device. Serial ports, when modem emulation is enabled, detect the phone number from ATD commands. Although the IP address of the remote host can be embedded directly into the ATD command, certain devices can't always be easily configured to do this.



Phone Number Translation

Phone Number	IP Address/Hostname	TCP Port	Dialout Phone Number (optional)	Protocol Settings	Delete*
Default Translation	host.testloc.com	5003		Edit Protocol Settings	☐
1(800)555-1212	192.168.1.100	5004	1(800)555-5555	Define Protocol Settings	☐
5551212					*

* Entries with asterisks have been automatically recorded from recent dial attempts. These entries will not be saved or used until the respective translation information is entered into the table.

Save Translation Settings

The Default Translation entry is used if the dialed phone number is not found in the list. If there is no default entry, then the call will be routed to the modem (dial-backup) port, if present.

The dial backup port will also be used if the host associated with a given phone number is not available. In this case, by default, the modem will dial the same number that came in the port. However, you may specify a Dialout Phone Number to be used on dial backup instead.

The phone number table has a number of features to ease initial configuration. When an attached device dials a number that is not in the table, the gateway creates a dummy entry in the table. This entry will consist of just the phone number. Until you fill in the remainder of the entry (IP Address/Hostname and Port) this entry will not be used.

Once you have created an entry in the table, a link to the associated entry on the **Protocol Settings** page appears on the right. If the protocol is not yet defined, this link, "Define protocol", will create a new entry on the **Protocol Settings** page, otherwise the link will be "Edit protocol".

The translation table screen allows you to add up to 5 new entries at a time. A total of 256 entries may be configured including the default entry.

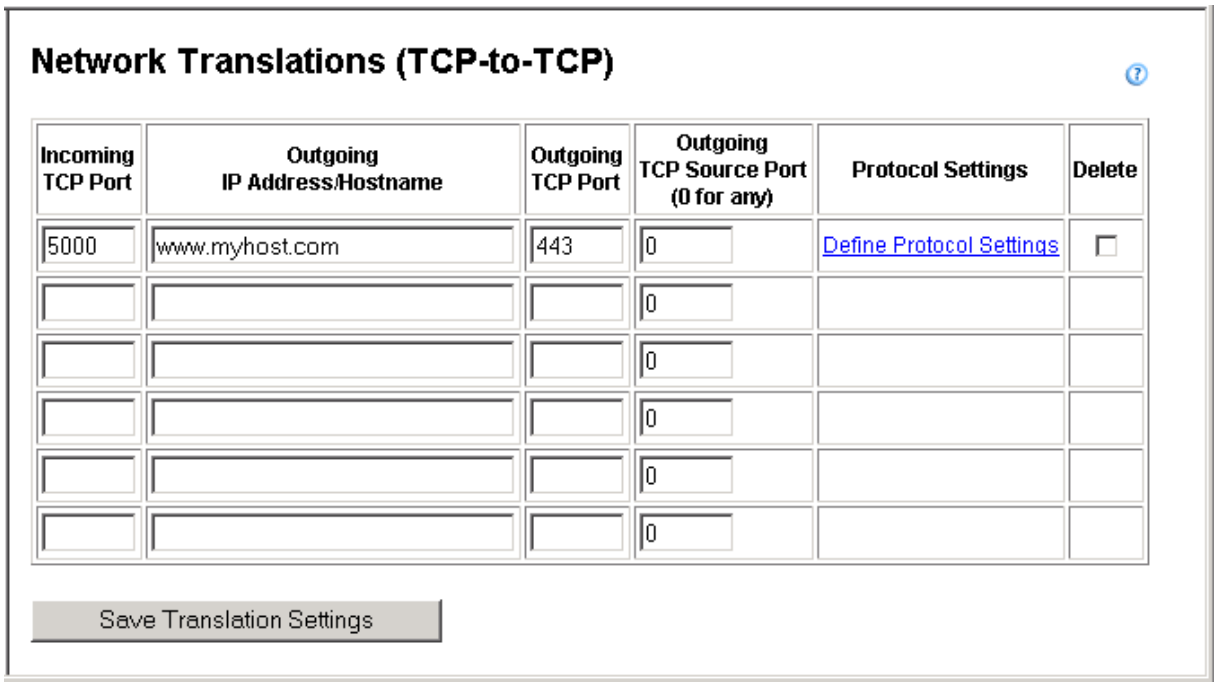
In the example above, if the attached device dials 18005551212, the port will be connected to the host at 192.168.1.100 on TCP port 5004. This host is not yet defined, so it will use the default TCP protocol. If that host is not available, the dial backup port will dial 1-800-555-5555. If the attached device dials any other number, the port will be connected to host.testloc.com:5003, whose protocol is defined. And the terminal has actually dialed 555-1212, generating an automatic, but not yet saved, entry.

Network Translation

The gateway is capable of accepting incoming TCP connections and redirecting them to remote TCP hosts. This functionality is called network translation and behaves much like a TCP "pipe" between two systems.

It is also possible to modify the network protocol traveling through the TCP pipe by using the Protocol Settings page to define the remote host's protocol requirements. The most common use for this functionality is to add SSL encryption to an incoming TCP connection prior to sending it along to the remote host.

The Network Translation table is used to define network mappings for TCP pipes. You must first specify the incoming TCP port to which your device or application will connect. Then, you must specify the outgoing hostname and destination TCP port for the TCP pipe.



You may also specify the source TCP port for the outgoing TCP connection. Usually, this should be set to 0 to allow automatic selection of the source port. However, if you have a firewall that imposes limits on source TCP ports then you may need to set this to something specific. Note that if you specify something other than 0, you will be limited to only 1 TCP pipe at-a-time for any given destination port.

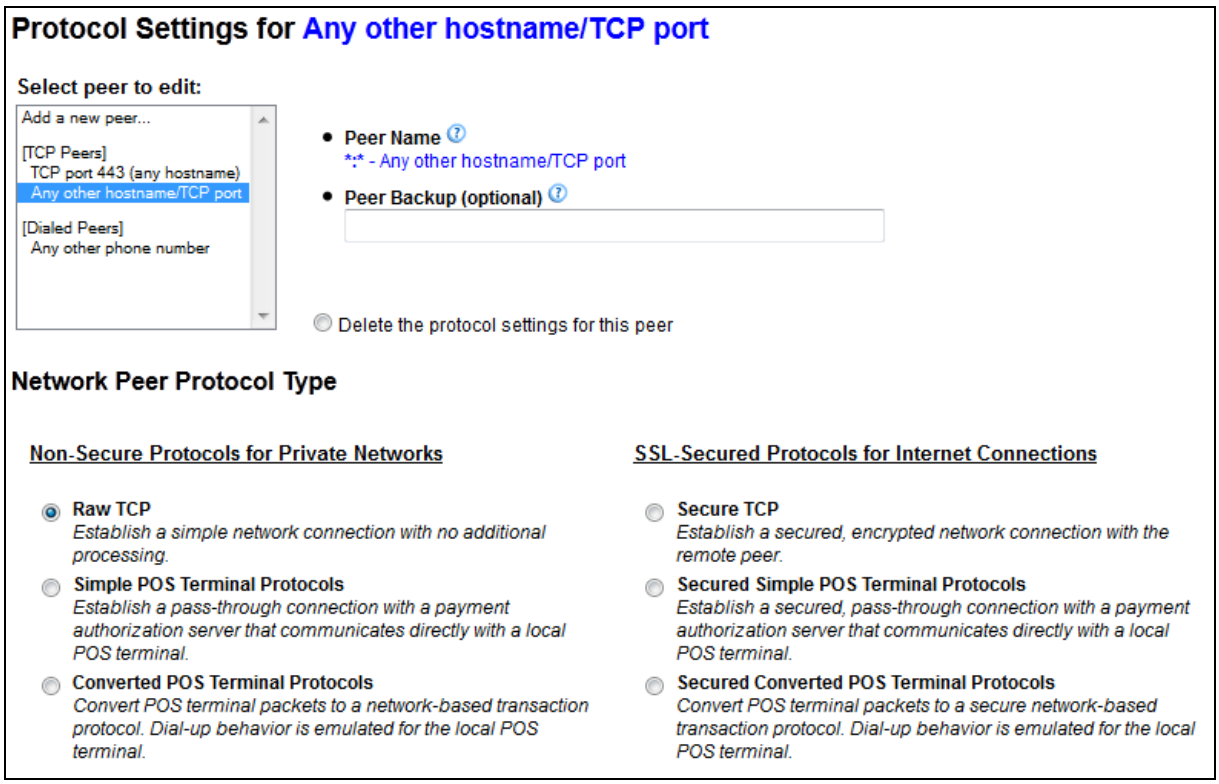
In the example above, if the gateway receives an incoming TCP connection on TCP port 5000, a TCP pipe will be established to www.myhost.com on TCP port 443. Since the TCP source port is 0, any number of simultaneous connections are allowed and the TCP source port will be automatically chosen for each one.

As in the phone number translation table, the protocols for the outgoing Host and TCP Port combinations are defined in the **Protocol Settings** page.

Protocol Settings

For each host (peer) you will make an outgoing connection to, you need to specify the protocol options used for that host. For each host, select the Host from the "Select peer to edit" selection box. Select "Add a new peer definition" link to add a new host.

The hosts are identified by their IP address or Hostname and TCP port (example: "host.peer.com:443"). You may also specify wild cards. Specific host names and/or port numbers take precedence over the wild cards. An asterisk for the IP address/hostname (for instance "*:443") means any other host when connecting on port 443. An asterisk for the port number (for instance "host.peer.com:*") refers to any other port on that host. And a double asterisk ("*:*") refers to all other hosts.


Protocol Settings for Any other hostname/TCP port
Select peer to edit:
Add a new peer...
[TCP Peers]
TCP port 443 (any hostname)
Any other hostname/TCP port
[Dialed Peers]
Any other phone number
Peer Name
: - Any other hostname/TCP port
Peer Backup (optional)
Delete the protocol settings for this peer
Network Peer Protocol Type
Non-Secure Protocols for Private Networks
Raw TCP
Establish a simple network connection with no additional processing.
Simple POS Terminal Protocols
Establish a pass-through connection with a payment authorization server that communicates directly with a local POS terminal.
Converted POS Terminal Protocols
Convert POS terminal packets to a network-based transaction protocol. Dial-up behavior is emulated for the local POS terminal.
SSL-Secured Protocols for Internet Connections
Secure TCP
Establish a secured, encrypted network connection with the remote peer.
Secured Simple POS Terminal Protocols
Establish a secured, pass-through connection with a payment authorization server that communicates directly with a local POS terminal.
Secured Converted POS Terminal Protocols
Convert POS terminal packets to a secure network-based transaction protocol. Dial-up behavior is emulated for the local POS terminal.

For each host, select the protocol to use for the connection and the options for that connection. The available options vary depending on the protocol chosen. You may select option under either:

- Non-Secure Protocols for Private Networks - The options in this column are only for use with Private Network connections such as Satellite, Frame Relay or VPN. These are non-secure protocols.

or

- SSL-Secured Protocols for Internet Connections - The options in this column use SSL to securely send transactions over public Internet connections. These connections generally go to SSL gateway sites that have their own private connection to the payment processors.

To remove a host from the list, select "Delete the protocol settings for this peer".

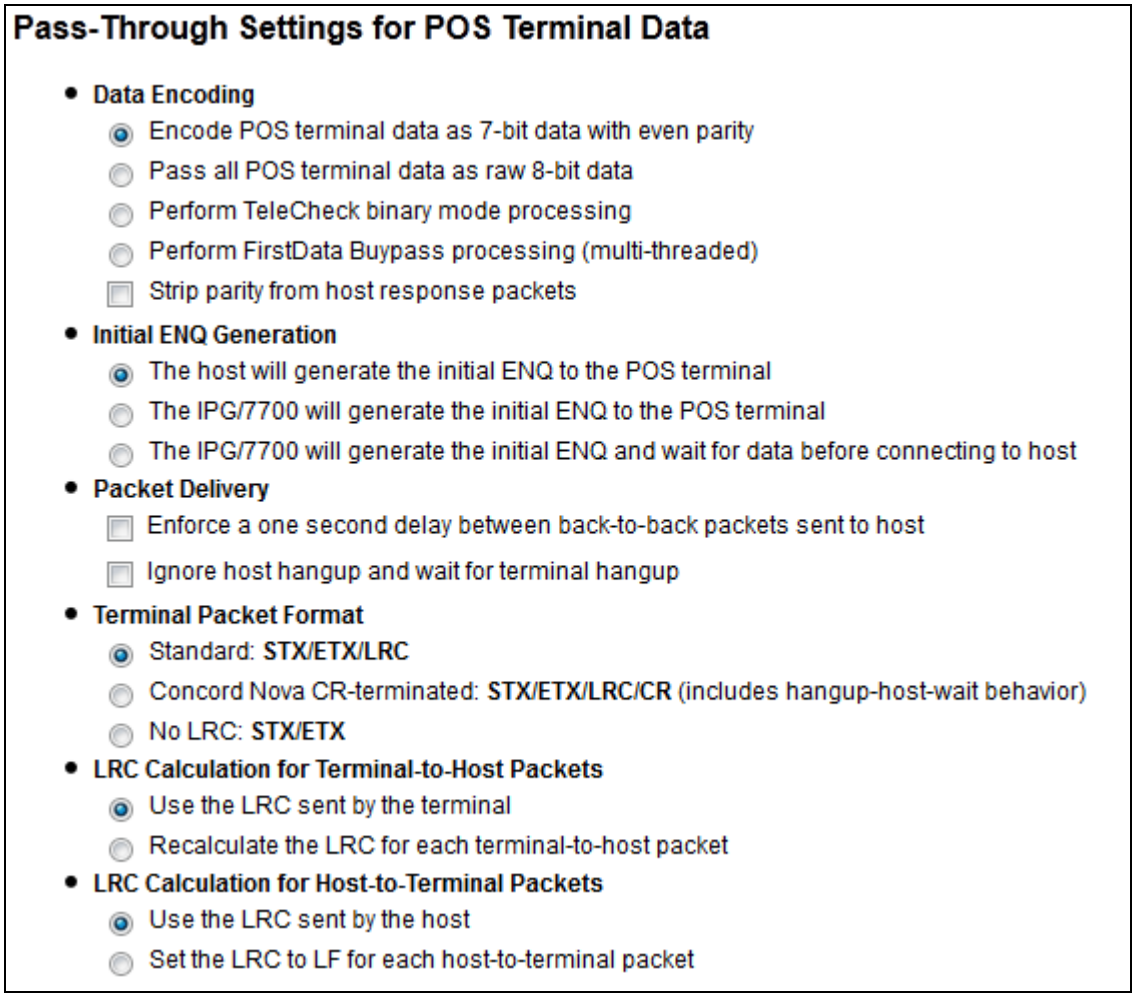
Raw or Secure TCP

In Raw or Secure TCP mode, the gateway establishes a TCP connection to the host but does no additional processing. Data arriving from either the terminal or the host is sent to the other side as soon as it is detected.

(Secured) Simple POS Terminal Protocols

With Simple POS Terminal Protocols, the gateway establishes a pass-through connection with a payment authorization server that communicates directly with a local POS terminal. The gateway does recognize Visa2 packet formats and will wait for an entire packet (typically bounded by STX … ETX LRC) from the terminal before forwarding terminal data to the host. Data not in packet boundaries are forwarded as soon as they are detected.

There are a number of options when using Simple POS protocol. Note that these settings are independent of the serial settings for the port.


Pass-Through Settings for POS Terminal Data
Data Encoding
Encode POS terminal data as 7-bit data with even parity
Pass all POS terminal data as raw 8-bit data
Perform TeleCheck binary mode processing
Perform FirstData Buypass processing (multi-threaded)
Strip parity from host response packets
Initial ENQ Generation
The host will generate the initial ENQ to the POS terminal
The IPG/7700 will generate the initial ENQ to the POS terminal
The IPG/7700 will generate the initial ENQ and wait for data before connecting to host
Packet Delivery
Enforce a one second delay between back-to-back packets sent to host
Ignore host hangup and wait for terminal hangup
Terminal Packet Format
Standard: STX/ETX/LRC
Concord Nova CR-terminated: STX/ETX/LRC/CR (includes hangup-host-wait behavior)
No LRC: STX/ETX
LRC Calculation for Terminal-to-Host Packets
Use the LRC sent by the terminal
Recalculate the LRC for each terminal-to-host packet
LRC Calculation for Host-to-Terminal Packets
Use the LRC sent by the host
Set the LRC to LF for each host-to-terminal packet

"Data Encoding" determines how the data is processed going to and from the host.

- "Encode POS terminal data as 7-bit data with even parity" sends the data bytes going to the host as if they were 7-bit data with even parity.
- "Pass all POS terminal data as raw 8-bit data" sends data to the host exactly as it was received on the port
- "Perform TeleCheck binary mode processing" supports binary mode packets from a TeleCheck Eclipse terminal. These are sent to the host in 8-bit raw mode.

- "Perform FirstData Buypass processing (multi-threaded)" support Buypass mode packets which have a binary length included. These are sent to the host in 8-bit raw mode.
- "Strip parity from host response packets" Some hosts respond with the parity bit set. Selecting this option strips the parity bit from the bytes before transmitting them out the local port interface.

"Initial ENQ Generation" selects whether the host or the gateway will generate the initial ENQ to the terminal port.

"Packet Delivery" selects parameters for communicating with the host.

"Terminal Packet Format" selects how the gateway determines the end of the incoming packet.

"LRC Calculation for Terminal-to-Host Packets" and "LRC Calculation for Host-to-Terminal Packets" enable the gateway to use the LRC's provided in the packets or to locally calculate them either going to the host or to the terminal.

(Secured) Converted POS Terminal Protocols

In the case of Simple POS, the communication supported by the original terminal (perhaps a dial-up or serial based device) and the IP-based host generally match. But in some cases an IP-based host does not communicate exactly like its dial-up counterpart. The gateway is capable of converting standard POS terminal packets into network packets that are suitable for use with several types of network transaction authorization protocols. In virtually all cases, the gateway does not modify the contents of the payload of the transaction, but is simply "re-wrapping" the transaction in a different communication protocol.

A wide variety of Converted POS protocols are supported (see partial list below). Which protocol is appropriate for your application is determined by the device you are using – which determines how the gateway communicates with the local device – and by the host you are using – which determines how the gateway communicates with the host, converting the data in both directions.

After selecting "SSL-Secured Protocols for Internet Connections", select the appropriate protocol from the list. Some protocols require additional information. If this is the case, when you select that protocol an additional selection area will be visible under the "POS Terminal to Network Host Conversion Settings" section.

Converted Protocols

POS Terminal to Network Host Conversion Settings

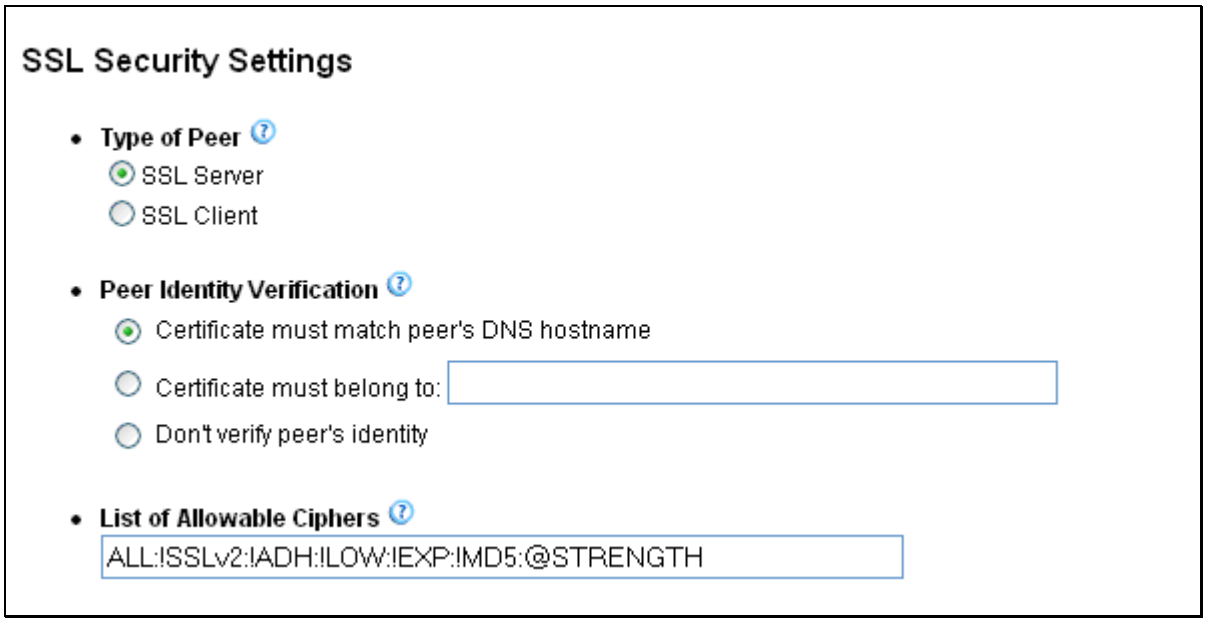
- **Alphyra Format:** Remove STX/ETX/LRC and add CR
- **ArJay Format:** Encapsulate dial terminal format into HTTPS for ArJay host.
- **Buypass Format:** Remove STX/ETX/LRC headers from each terminal packet
- **Cash Depot Format:** Pass STX/ETX/LRC packets and generate ENQ and ACK locally
- **CFN Direct Format:**Recognize STX...ETB...EOT or STX...ETX LRC packets from term and send with two byte length to host
- **CFN Gasboy Format:**Recognize STX...ETB...EOT packets from term and send as complete packet to host
- **Columbus Data/Cardtronics Format:** Encapsulate using the Columbus Data/Cardtronics transaction protocol
- **Columbus Data IP Conversion:** Strip 2-byte length header and encapsulate using STX/ETX/LRC
- **Concord EFS Format:** Enclose the entire terminal packet within a Concord EFS packet header
- **ECHO/NCN Format:** Convert SPKT/ECHK requests to Echo/NCN gateway format
- **EchoSat SPG CPNI:** Converts legacy CPNI packets to EchoSat SPG Gateway
- **EchoSat SPG CPNI (Delayed Connect):** Converts legacy CPNI packets to EchoSat SPG Gateway with connection delay
- **EchoSat SPG CPNI (Health Check):** Converts legacy CPNI packets to EchoSat SPG Gateway with local health check processing
- **EchoSat SPG SPS (Asynch):** Converts SPS/NWS packets to EchoSat SPG Gateway
- **EchoSat SPG SPS (Bisync):** Converts SPS/NWS packets to EchoSat SPG Gateway
- **EchoSat SPG Legacy X3:** Converts legacy X3 packets to EchoSat SPG Gateway
- **Excentus RISE Serial Protocol:** Pass STX/ETX/LRC packets and generate ENQ and ACK locally
- **Excentus RISE Wrapping Protocol:** Wrap packet in XML with header data (see additional fields below)
- **Excentus RISE Serial and Wrapping Protocol:** Pass STX/ETX/LRC packets and generate ENQ and ACK locally, then wrap packet in XML with header data (see additional fields below)
- **FDMS Asynchronous Terminal Dial Format (FDMS South and FDMS Nashville):** Encapsulate terminal packets using the FDMS Asynchronous Terminal Dial message format
- **FDMS Leased Line Format (FDMS North and FDMS Nashville):** Encapsulate terminal packets using the FDMS Leased Line message format
- **First Horizon Internet Gateway Format:** Encapsulate using the First Horizon Internet Gateway protocol
- **FuelBay Data Collector:** Collect terminal information and encapsulate using the FuelBay protocol
- **Global Payments TCP/IP Format:** EDC and Global Check terminal packets are encapsulated using Global Payments TCP/IP host format
- **Global Payments Gateway @dvantage Format (asynch & synch):** Global Check and EDC terminal packets are encapsulated for delivery to Gateway @dvantage
- **Global Payments Gateway @dvantage Format (asynch only):** Global Check and EDC terminal packets are encapsulated for delivery to Gateway @dvantage
- **Heartland Payment Systems ISO8583 e-Header Conversion:** Remove STX/ETX/LRC headers from each terminal packet
- **InComm Format:** Total Control message format
- **Indue Format:** Local Visa II processing (no EOT), 2 byte, exclusive, net-endian length to host

Additional Converted Protocols

- **Ingenico Download Passthru:** Passthru Ingenico download but strip initial V42
- **Mannatec Fleet Card Format:** A Mannatec header packet is sent to the host at the beginning of the transaction
- **MerchantLink siteNET/M2 Internet Gateway Format:** Encapsulate using the MerchantLink siteNET/M2 Internet Gateway protocol
- **Merchant E-Solutions format:** Send Visa II packets to NetConnect HTTP host.
- **Metavante:** Remove STX and LRC and add 2 byte exclusive length
- **Micros siteNET Gateway Format:** Encapsulate using the Micros siteNET Gateway protocol
- **Moneytree Format:** Packets are passed through unmodified, control bytes are handled locally
- **NBS CRC/LRC Conversion:** Converts between terminal CRCs and host LRCs.
- **Network Services International (NSI) Format (ABP):** Add merchant ID, client ID, and 2-byte length header
- **Network Services International (NSI) Format (ABP/NCC):** Add merchant ID, client ID, and 2-byte length header
- **Network Services International (NSI) Simple Visall Format:** Remove STX/ETX/LRC headers from each terminal packet
- **Opticard HTTPS Format:** Encapsulate using the Opticard transaction protocol
- **Paymentech™ NetConnect Format:** Encapsulate using the Paymentech™ NetConnect protocol
- **Paymentech™ TCP/IP Format (PNS):** Remove LRC and insert a PNS packet header
- **PMNPWX6204 Format:** Spoof Visa II protocol, remove STX/ETX/LRC and add 2 byte exclusive length
- **SmartLaCarte Format:** Encapsulate using the SmartLaCarte Internet protocol
- **Smart Transaction Systems Format:** Encapsulate using the Smart Transaction transaction protocol
- **STAR NE Format:** Send local ENQ, two byte header to/from host
- **Systech Identification:** Sends a Systech identifier at the beginning of the connection
- **Systems Techniques Format:** Remove STX/ETX/LRC and add a NUL byte to the end of each terminal packet
- **Tandem Online System Format:** Remove STX/ETX/LRC and insert a Tandem packet header
- **T-Chek Format:** Locally interact with terminal, precede packets to host with ACK, append LRC to responses.
- **Tranax RMS Conversion:** Synchronize ENQ delivery between RMS client and terminal
- **U.S. Bank:** Two byte header to/from host
- **Valutec Format:** Encapsulate using the Valutec transaction protocol
- **Wait for ENQ:** Wait for ENQ from peer before proceeding
- **Western Union Format:** Add 2-byte length header, strip LRC

SSL Options

When SSL is configured on an outgoing connection, you must also specify the SSL connection parameters for each SSL peer. An SSL peer is the remote system that will be on the other end of the secure SSL connection.



Type of Peer

For an outgoing connection the SSL Peer is normally an SSL Server. However, either side can be a server or client. This option decides which is which during the SSL handshake.

Peer Identity Verification

This field can be used to enable verification of the remote peer's identity. Peer identity verification must be enabled in order to guarantee that your secure data is not being intercepted by an unwanted third-party. If you have specified the fully qualified domain name (FQDN) in the peer address and this matches the SSL peer's certificate, then click the 'Certificate must match peer ""' button. If you are using an IP address for the peer address, check the 'Certificate must belong to' button and enter the FQDN. Or you may select 'Don't verify peer's identity'.

Caution: choosing 'Don't verify peer's identity' opens the possibility for an unwanted third-party to masquerade as a given peer on the Internet and intercept transactions. Normally you should not choose this option.

SSL verifies peer identity by using signed certificates. To verify a remote peer's identity:

1) The remote peer must provide a valid certificate.

The remote peer must be configured to provide a valid certificate that proves its identity.

2) The certificate must be signed by a trusted certification authority (CA).

Certification authorities, or CAs, are organizations that issue and sign digital certificates. To verify the integrity of a remote peer's certificate, its digital signature is compared with the signatures of the CAs that are trusted by your application.

All trusted CAs must be pre-configured in the /usr/local/ssl/cert.pem file found in the gateway's local filesystem. This file contains certificates for trusted CAs and is used to verify the integrity of remote peer certificates.

3) The certificate must be owned by the correct DNS domain.

For optimum security, signed certificates should contain a fully qualified domain name (or FQDN) that ties the certificate to a particular host or domain. Otherwise, anyone with a valid certificate from one of your trusted CAs could intercept your secure transmission.

This field allows you to specify which domain name to expect in the certificate. If the certificate does not contain the expected domain name, the connection will be aborted.

Example

Supplying a peer FQDN of ssl.yourdomain.com will require that the remote peer provide a certificate registered to ssl.yourdomain.com, and that the certificate is signed by one of the certification authorities found in the gateway's /usr/local/ssl/cert.pem file.

List of Allowable Ciphers

This field specifies which authentication and encryption protocols will be allowed for this SSL connection. To maintain maximum security, it is important to allow only those ciphers that are sufficiently secure.

The default cipher list allows only reasonably secure ciphers to be used. If the remote peer does not support sufficiently modern ciphers, you may need to enable some of the less-secure ciphers.

The cipher list is specified using the same format as the standard OpenSSL cipher lists. This list is a set of cipher strings, separated by colons, that represents the available cipher suites:

ALL: All ciphers

HIGH: High-encryption ciphers (more than 128-bits)

MEDIUM: Medium-encryption ciphers (equal to 128-bits)

LOW: Low-encryption ciphers (56- and 64-bits, excluding export ciphers)

EXP: Export encryption ciphers

TLSv1: Transport Layer Security v1.0

SSLv3: Secure Sockets Layer v3.0

SSLv2: Secure Sockets Layer v2.0

DH: Diffie-Hellman Ciphers (including anonymous DH)

ADH: Anonymous Diffie-Hellman Ciphers

kRSA: RSA Public Key Exchange

aRSA: RSA Authentication

3DES: Triple DES Encryption

DES: DES Encryption

RC4: RC4™ Encryption

RC2: RC2™ Encryption

MD5: MD5 128-bit Message Digest

SHA1: SHA1/DSS1 160-bit Message Digest

Each cipher may also be prefixed with one of the following operators:

-: Exclude cipher from list (may be re-added by later options)

+: Move cipher to the end of the list

!: Permanently exclude cipher from this list

Finally, the @STRENGTH cipher string may be appended to the end of the list to specify that SSL negotiations give preference to higher-strength ciphers.

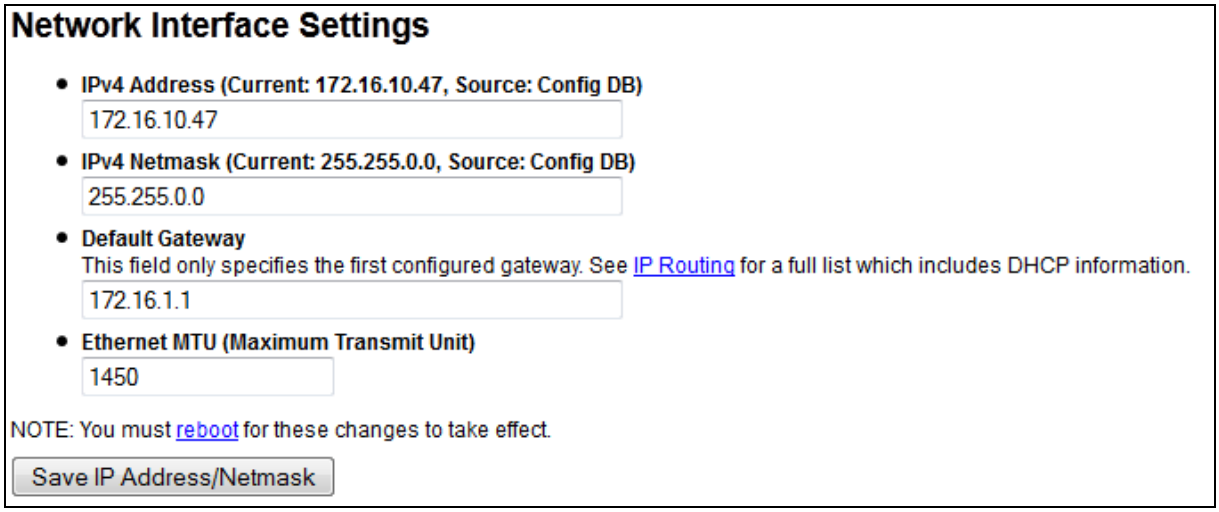
Click the help associated with this field to find the set of ciphers currently supported in the software on your Gateway.

Example

The cipher string **ALL:!SSLv2:!ADH:!LOW:!EXP:!MD5:@STRENGTH** is commonly used to disallow all the ciphers that are considered unacceptably weak. This cipher string enables all the supported SSL ciphers except for: SSL version 2 handshaking, Anonymous Diffie-Hellman, low-encryption ciphers, export encryption ciphers, and MD5. In addition, the SSL negotiation is instructed to choose the strongest ciphers supported by both SSL peers.

Network Settings

The **Network Settings** page allows you to set a number of local IP options on the gateway.


Network Interface Settings
IPv4 Address (Current: 172.16.10.47, Source: Config DB)
172.16.10.47
IPv4 Netmask (Current: 255.255.0.0, Source: Config DB)
255.255.0.0
Default Gateway
This field only specifies the first configured gateway. See IP Routing for a full list which includes DHCP information.
172.16.1.1
Ethernet MTU (Maximum Transmit Unit)
1450
NOTE: You must reboot for these changes to take effect.
Save IP Address/Netmask

IPv4 Address

You may permanently assign the IP address of the gateway by specifying it in this field. Doing so will disable BOOTP/DHCP.

If you want to re-enable BOOTP/DHCP, you can do so by setting the IP address to **0.0.0.0**, or by restoring the default configuration (see the section called **Restore Factory Defaults**).

IPv4 Netmask

Every IP address contains two pieces of information: the network number and the host number. A network number is assigned to each local area network and is shared by all the network devices on that network. Each network device, or "host", is assigned a unique host number. The IP netmask defines which portion of an IP address contains the network number, and which portion contains the host number. The default netmask depends on the "class" of the IP address that you are using. These classes are defined in Table 2-1.

Class	IP Address	Default Netmask	Network Number	Host Number
A	0.0.0.0 to 127.255.255.255	255.0.0.0	n.0.0.0	0.h.h.h
B	128.0.0.0 to 191.255.255.255	255.255.0.0	n.n.0.0	0.0.h.h
C	192.0.0.0 to 223.255.255.255	255.255.255.0	n.n.n.0	0.0.0.h

Table 2-1: Default Netmasks

It is often desirable to partition larger networks into a series of smaller networks that are separated by routers (also called "gateways"). This process is called "subnetting" and is accomplished by extending the default netmask. Some examples of common netmasks can be found in Table 2-2.

IP Address	IP Netmask	Network Number	Host Number
192.168.10.1	255.255.255.0	192.168.10.0	0.0.0.1
10.11.12.13	255.0.0.0	10.0.0.0	0.11.12.13
10.11.12.129	255.255.255.0	10.11.12.0	0.0.0.129
10.11.12.129	255.255.255.248	10.11.12.128	0.0.0.1

Table 2-2: IP Netmask Examples

If you are not using DHCP/BOOTP and your network uses subnets (or supernets), you can override the default net mask by specifying it in this field. Once you click the "Save IP Address/Netmask" button these parameters will be saved. They will take effect on the next reboot (see the **Reset/Reboot** section).

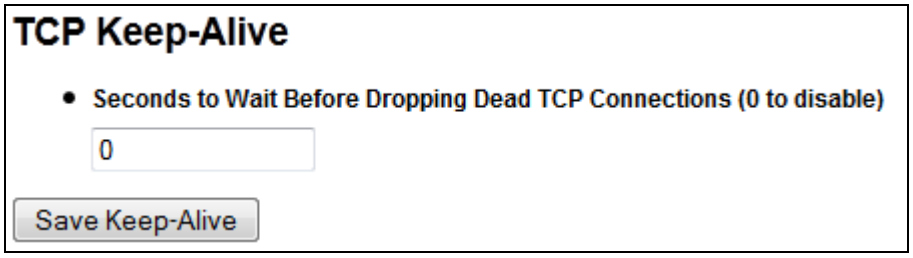
Default Gateway

The default gateway may be specified either on this page or the **IP Routing** page.

Ethernet MTU

Specifies the maximum size of packets sent on the local area network – the Maximum Transmit Unit or MTU.

TCP Keep-Alive



TCP keep-alive is a standard feature of TCP/IP that can be configured to automatically monitor the state of TCP connections. If one end of an idle TCP connection is severed (like by a network or power failure), it is possible for the other end to remain open indefinitely. If a network host fails while it has an open TCP connection to one of the gateway's serial ports, that serial port might remain unavailable until it is manually reset.

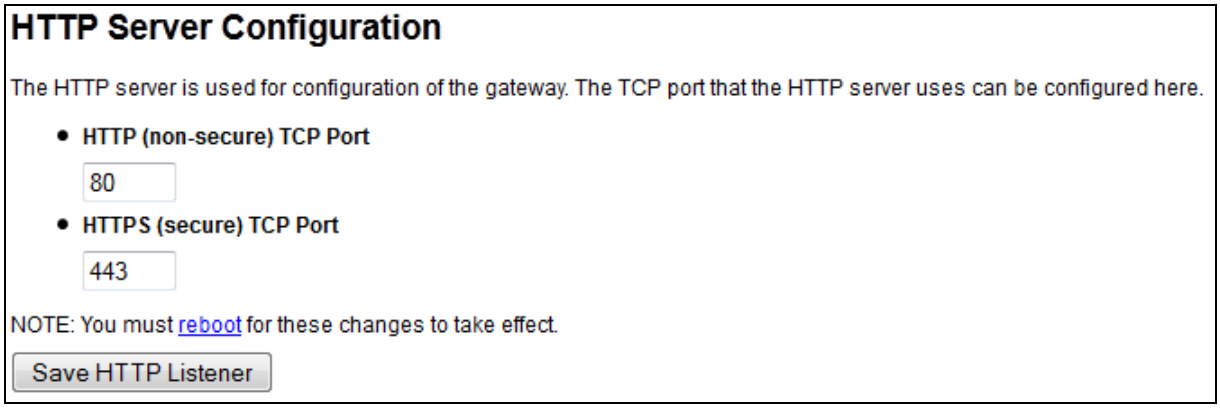
The optional TCP keep-alive feature sends special "keep-alive" packets to the remote TCP host in order to detect the situation where the remote host fails. If a failure is detected, the TCP connection is reset to allow other hosts to access the serial port.

To enable TCP keep-alives on serial-related network connections, enter the total time (in seconds) that you will allow TCP connections to remain idle before resetting them. The first keep-alive packet will be sent after the connection has been idle for half of this total time. After that, four more TCP keep-alive packets will be sent at regular intervals until a TCP response is received from the remote host. If no response is received before the total keep-alive time runs out, the TCP connection will be reset.

> **CAUTION:** Enabling TCP keep-alives will increase the amount of network traffic on your network. Unless you have a specific need for this feature, it is best to leave it disabled. If you do enable it, it is best to make the keep-alive timeout larger to reduce network traffic.

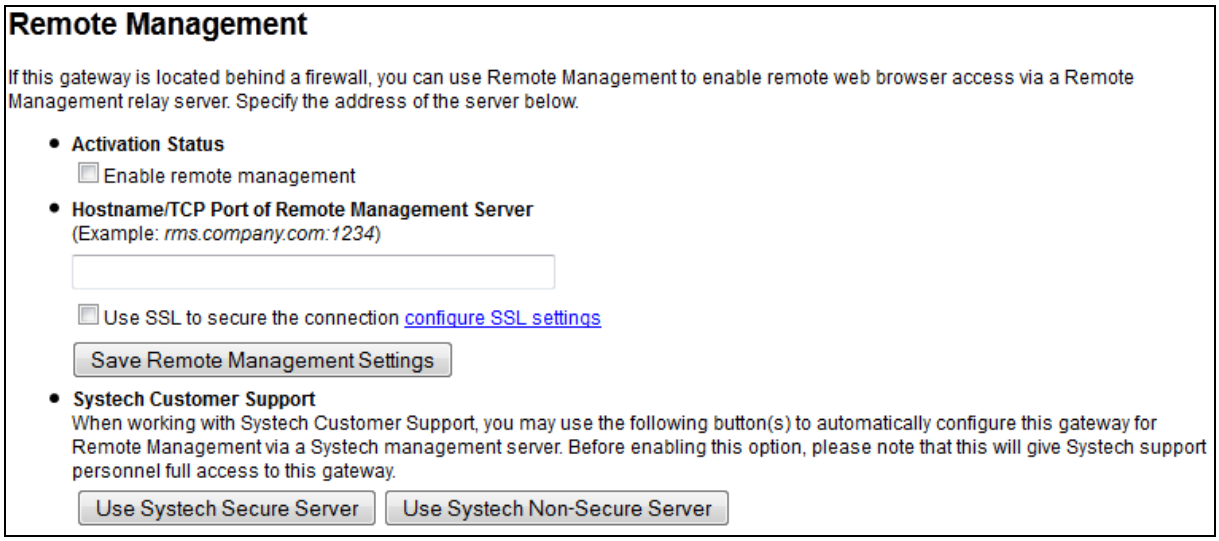
HTTP Server Configuration

You may specify the HTTP and HTTPS ports that the gateway will listen on for configuration settings.


HTTP Server Configuration
The HTTP server is used for configuration of the gateway. The TCP port that the HTTP server uses can be configured here.
HTTP (non-secure) TCP Port
80
HTTPS (secure) TCP Port
443
NOTE: You must reboot for these changes to take effect.
Save HTTP Listener

Remote Management

Remote Management (RM) allows administrators to access a unit when it is behind a firewall. When RM is enabled the gateway makes an outbound connection to an RM server and waits for HTTP traffic. When a client (administrator) wants to access the gateway, they point their browser at the RM server which connects the two.

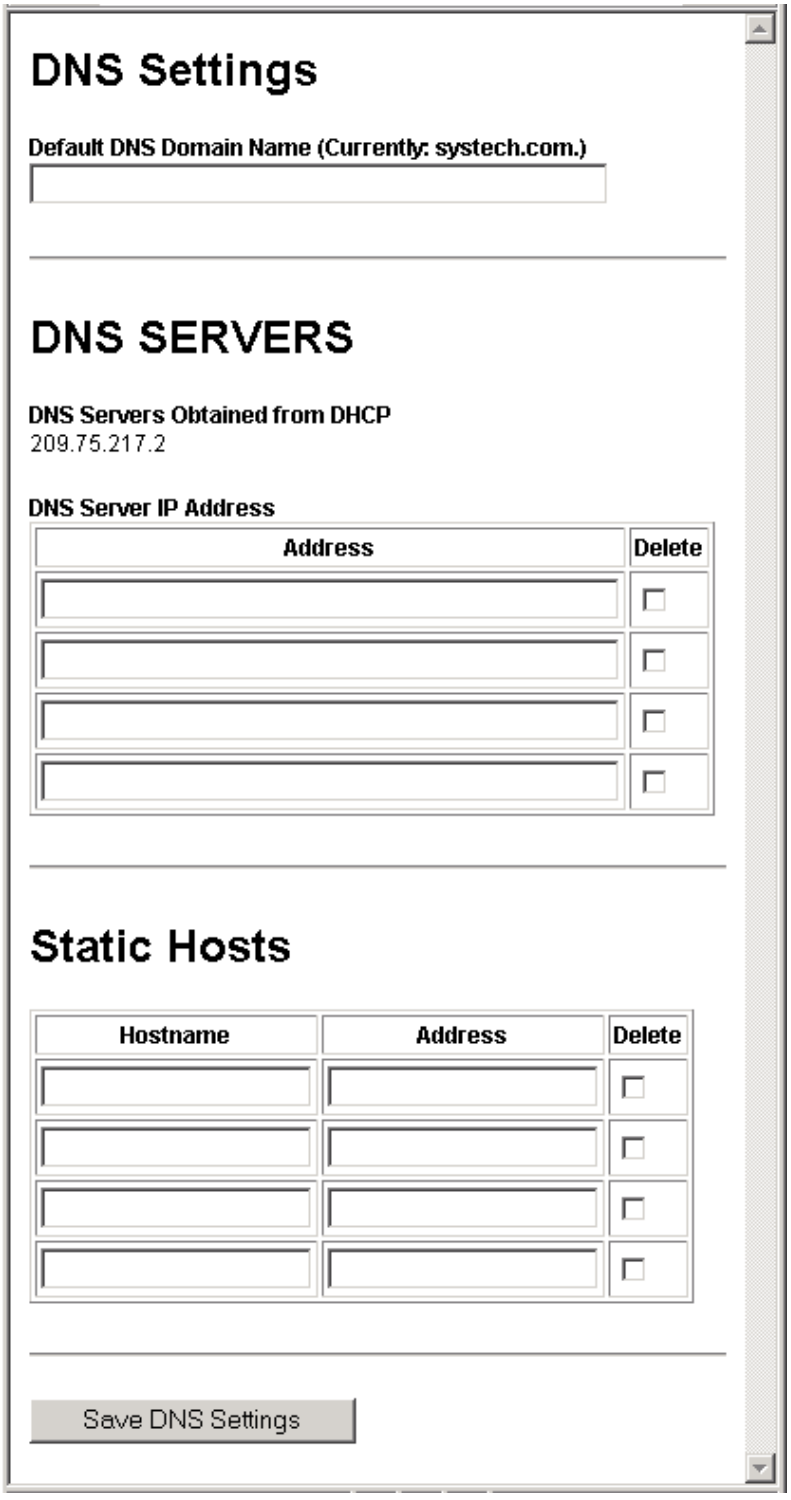

Remote Management
If this gateway is located behind a firewall, you can use Remote Management to enable remote web browser access via a Remote Management relay server. Specify the address of the server below.
Activation Status
Enable remote management
Hostname/TCP Port of Remote Management Server
(Example: rms.company.com:1234)
Use SSL to secure the connection configure SSL settings
Save Remote Management Settings
Systech Customer Support
When working with Systech Customer Support, you may use the following button(s) to automatically configure this gateway for Remote Management via a Systech management server. Before enabling this option, please note that this will give Systech support personnel full access to this gateway.
Use Systech Secure Server
Use Systech Non-Secure Server

You may manually specify a host and port and optionally select SSL, or you may click either "Use Systech Secure Server" or "Use Systech Non-Secure Server" to select the default host and SSL settings.

You may also configure RM but not enable it, then use the Light Weight Heart Beat mechanism to enable RM only when it is needed.

DNS Settings

The **DNS Settings** page allows you to specify a DNS name for your unit, specify the addresses of DNS servers to resolve names, and to pre-define some host names. The DNS name and servers can also be obtained from a DHCP server.



If the gateway is configured to use DHCP, it will try to get DNS configuration information from the DHCP server. You may also manually set up static DNS entries on this page. Having DNS configured allows you to specify names in place of IP addresses in your configuration.

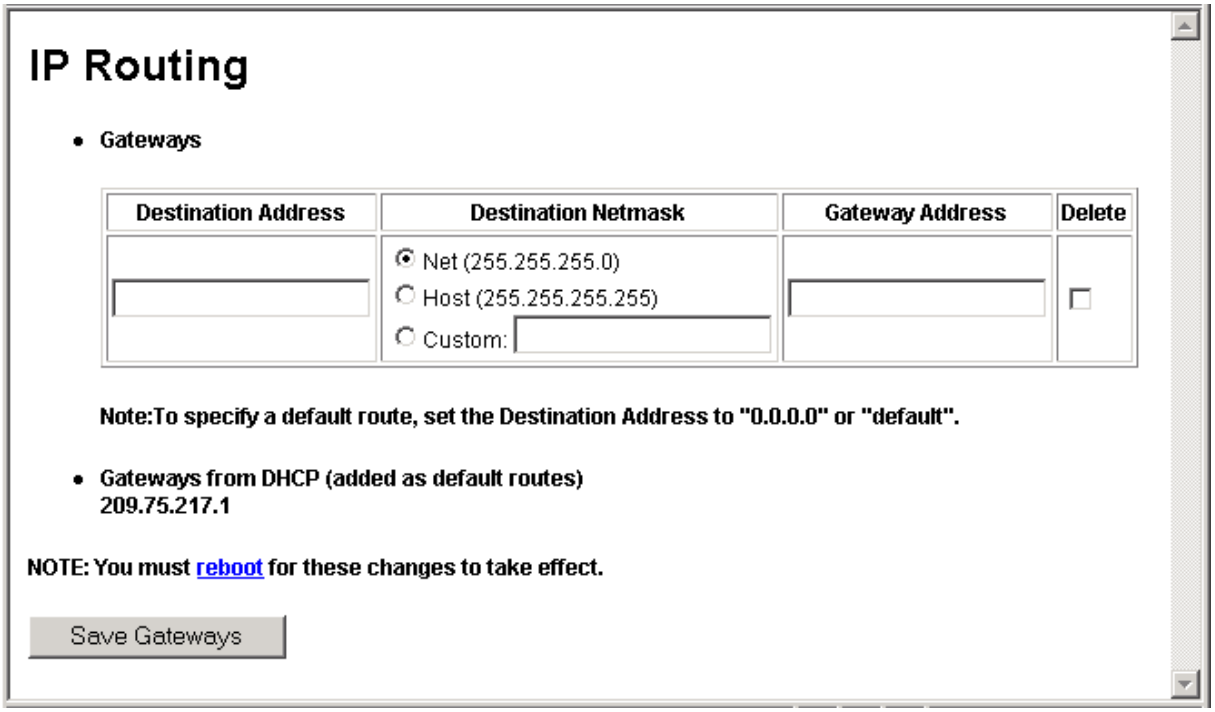
The DNS Domain Name is used as the default domain for any names you specify. For instance, if you specify the name "foo" in the ping command and the domain name "company.com" in the DNS Domain Name above, the ping command will do a DNS lookup on the name "foo.company.com".

The DNS Server IP Addresses are used to specify the addresses of one or more machines that can be used to resolve names to IP addresses.

The Static Hosts entries are used to define local host name to IP address mappings.

IP Routing

The **IP Routing** page lets you configure network routes for accessing remote networks:



If the gateway is configured to use DHCP, it will try to get gateway configuration information from the DHCP server. You may also manually set up static routes on this page.

Each IP route consists of a destination IP address, a netmask, and a gateway IP address. Depending on the netmask, the destination IP can specify one of two route types:

- **Network route:** This is a route to an IP network. The netmask defines which portion of the destination IP address contains the network number.
- **Host route:** This is a route to a specific IP host. The netmask is always 255.255.255.255.

The special destination IP address of 0.0.0.0 or *default* specifies a **default route**, which is used whenever a more specific route does not exist.

This is all summarized by the examples in Table 2-3.

Destination IP	Netmask	Gateway	Meaning
192.168.2.100	255.255.255.255	192.168.2.1	**Host route:** Send all packets destined for IP address 192.168.2.100 to the router at 192.168.2.1
192.168.2.0	255.255.255.0	192.168.2.2	**Network route:** Send all packets destined for the network 192.168.2.x to the router at 192.168.2.2
0.0.0.0	ignored	192.168.2.3	**Default route:** Send all other packets to the router at 192.168.2.3

Table 2-3: Examples of IP Route Types

For each route you wish to add, specify a destination address, select a destination netmask and specify the gateway address. To specify a default route, set the destination address to the word **default** or to the IP address **0.0.0.0,** and select the **Net** destination netmask.

Some examples of valid routes are:

Destination Address	Destination Netmask	Gateway Address
default	Net	192.168.2.1
10.10.10.0	Net	192.168.2.200
10.10.10.13	Host	192.168.2.201
10.0.0.0	Custom (255.255.255.0)	192.168.2.202

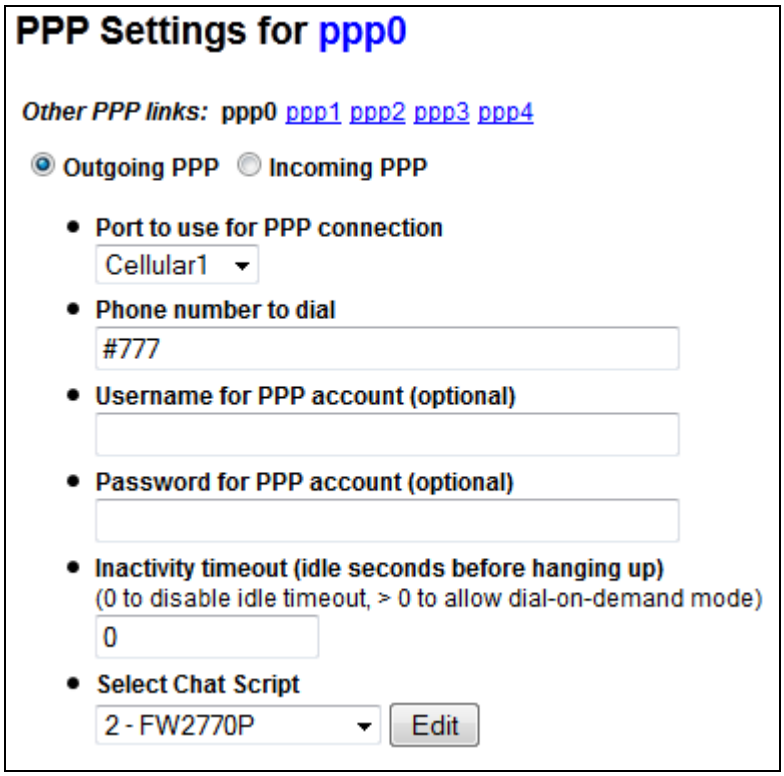
You must click the "Save Gateways" button to save any changes you make. The new route configuration will take effect on the next reboot (see the **Reset/Reboot** section).

To remove a static route, clear the destination and gateway addresses then click the "Save Gateway" button.

PPP Settings

The **PPP Settings** page lets you configure PPP on one or more ports. Typically this is used for communication with some cellular modules. It may also be use for dial backup to a dialup Internet Service Provider.

Basic settings:


PPP Settings for ppp0
Other PPP links: ppp0 ppp1 ppp2 ppp3 ppp4
Outgoing PPP
Incoming PPP
Port to use for PPP connection
Cellular1
Phone number to dial
#777
Username for PPP account (optional)
Password for PPP account (optional)
Inactivity timeout (idle seconds before hanging up)
(0 to disable idle timeout, > 0 to allow dial-on-demand mode)
0
Select Chat Script
2 - FW2770P
Edit

Up to 5 PPP sets may be defined. Select the one you want to use. The specify the following:

Port to use for PPP connection

Phone number to dial

Username for PPP account

Password for PPP account

Inactivity timeout

Chat script

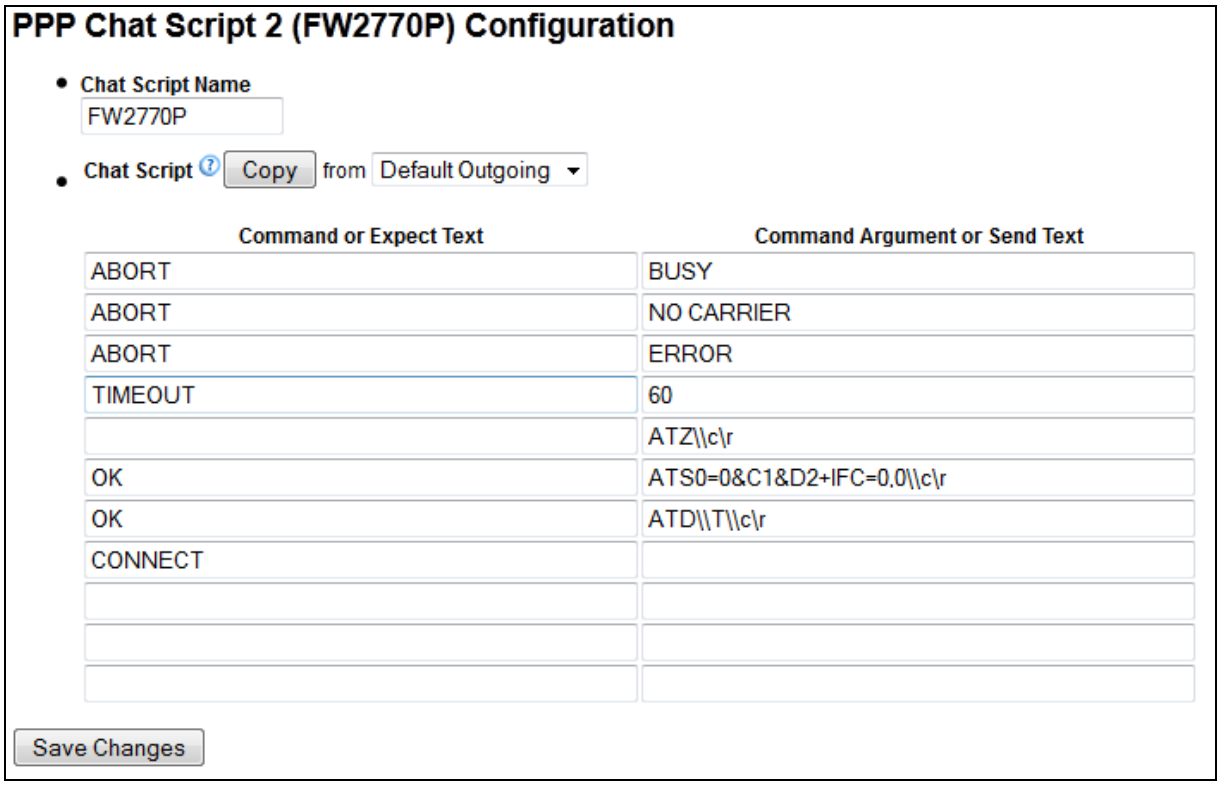
The PPP chat script entries consist of pairs of command/command arguments or expect expressions/send text.

Two commands are supported: ABORT and TIMEOUT. The ABORT command argument is a text string to be matched with the incoming chat text. When the chat processing sees a text string matching an ABORT command argument, the current chat expression is aborted. The TIMEOUT command argument is the number of seconds to use for the timeout.

The expect expressions typically consist of text to be matched by the chat processing. When a match is found, the corresponding send text is sent. Expect expressions can contain sub-expressions separated by hyphens (-). Send text supports the following escape characters:

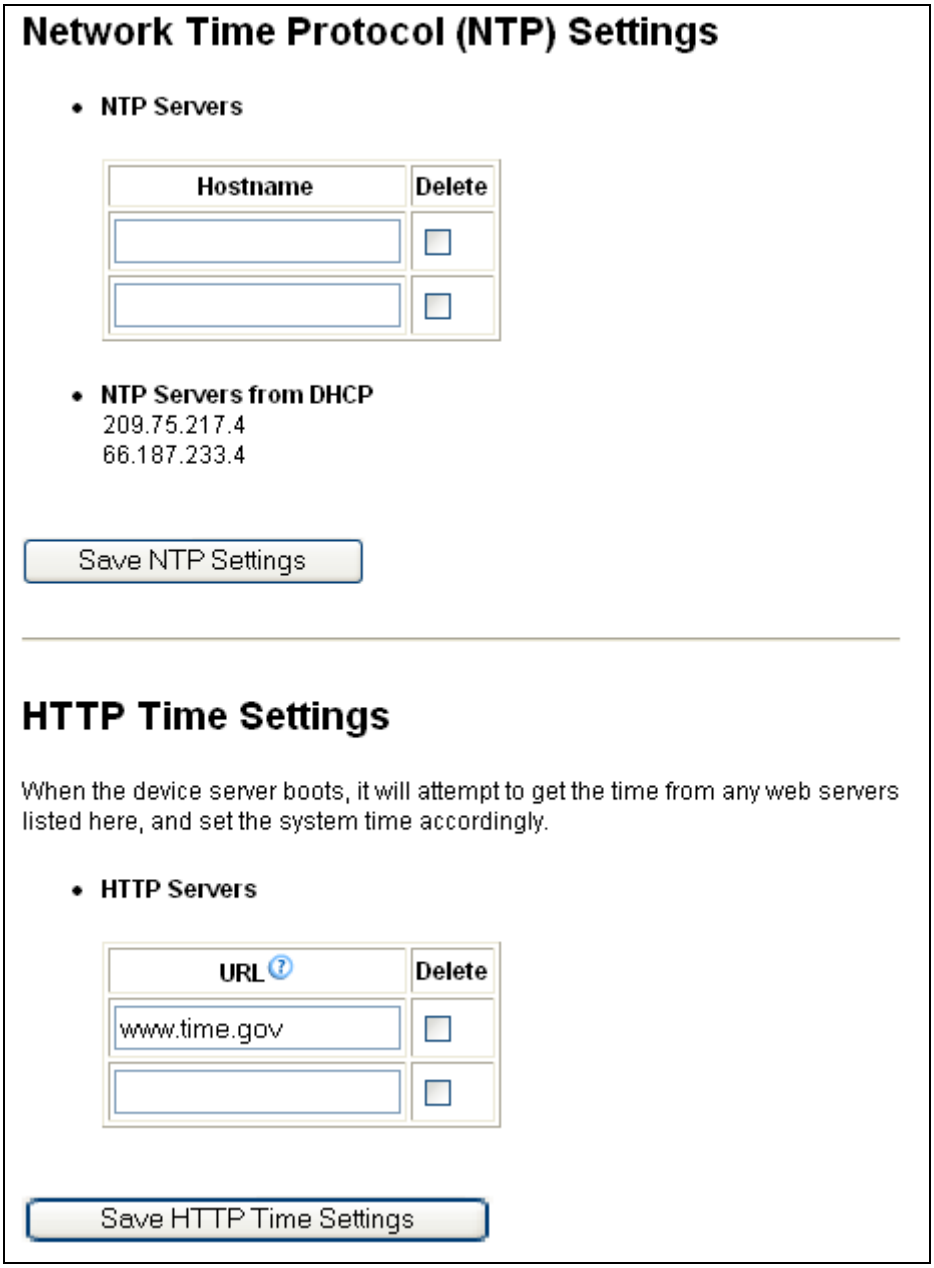
Escape	Substitution
\\L	username
\\P	password
\\T	phone number
\\c	suppress carriage return, linefeed
\r	carriage return
\n	linefeed

In some situations, the \\L and \\P escapes can be used in the expect expression to capture the username and password.



Time Settings

The **Time Settings** page allows you to configure NTP or HTTP time-servers to get the system time from.



If the gateway is configured to use DHCP, it will try to get NTP server information from the DHCP server. You may also manually set up the addresses on this page.

If you are using SSL for peer verification or you are using the automatic update feature, the gateway must obtain a valid time from an external time server.

The HTTP server you specify need not be a designated time server – just a reliable server. The gateway derives the system time from the HTTP header the server returns.

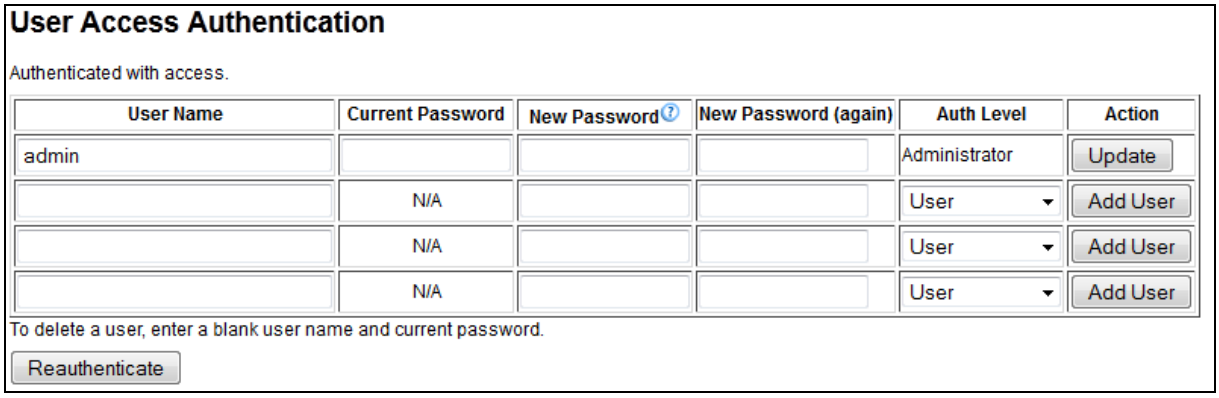
The NTP service uses UDP port 123. If your gateway is behind a firewall you may need to allow accesses to this port through the firewall.

Security Settings

The security settings link includes settings for the System Passwords, Network Isolation and access to the Security Log as defined in the following sections.

System Password

The gateway's user interface and administrative functions can be protected with usernames and passwords.



Two levels of authentication are supported – user and administrator. Users may view status. Administrators may view status and logs and change settings.

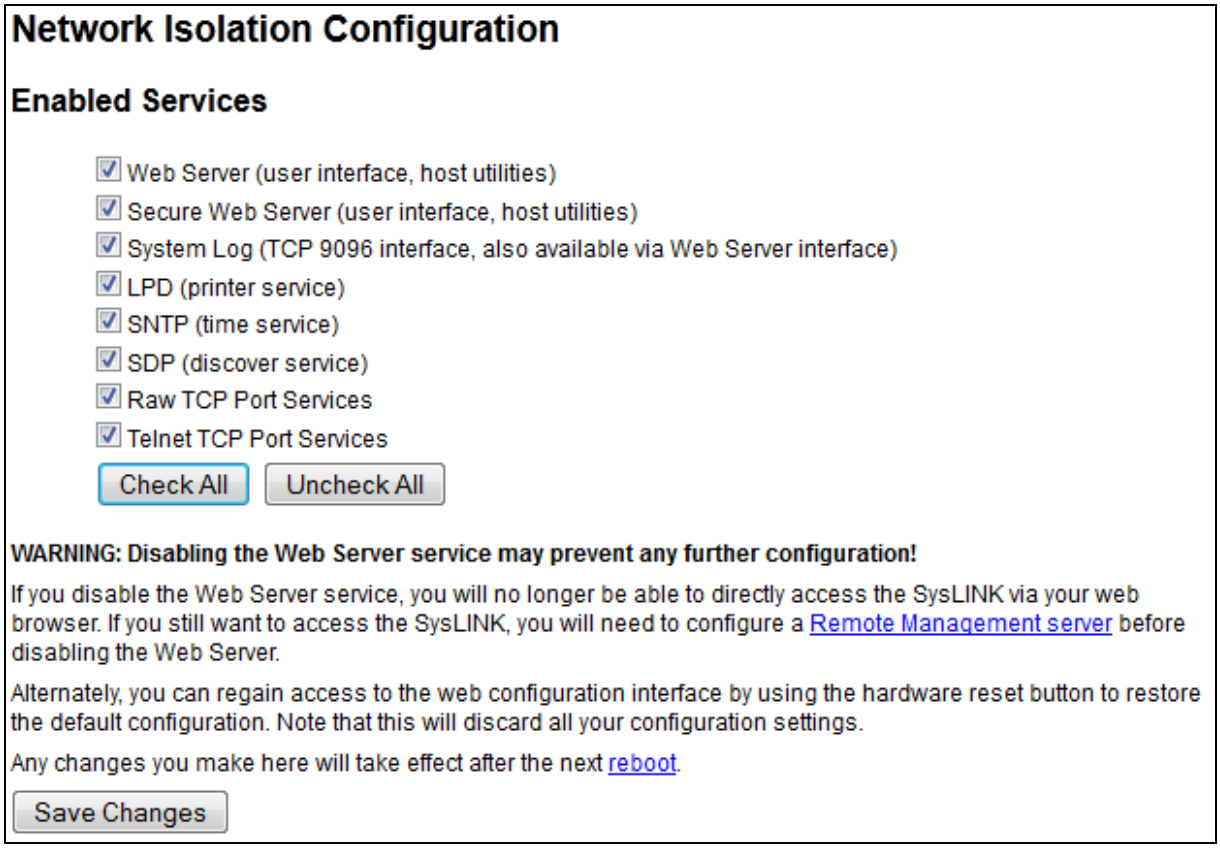
Once a password is set, your web browser will prompt you for the authentication whenever you try to access sensitive configuration pages. The browser will ask for a username and password. The default username is "admin". You may add other usernames and specify both their password and authentication level. The admin username and password is also used by Systech host utilities that manage the gateway.

A password must contain at least one numeric digit and one alpha character and be at least 7 characters in length. It may not contain any whitespace or control characters. A password may not be longer than 15 characters. A password must be different than the previous four passwords used for a given username.

Use the Reauthenticate button to request that the browser authenticate again.

Network Isolation Configuration

By default, all network services are enabled. However, for security, any or all listening services may be disabled. Unselect any services that you wish to disable. These changes will not take effect until the next reboot.


Network Isolation Configuration
Enabled Services
Web Server (user interface, host utilities)
Secure Web Server (user interface, host utilities)
System Log (TCP 9096 interface, also available via Web Server interface)
LPD (printer service)
SNTP (time service)
SDP (discover service)
Raw TCP Port Services
Telnet TCP Port Services
Check All
Uncheck All
WARNING: Disabling the Web Server service may prevent any further configuration!
If you disable the Web Server service, you will no longer be able to directly access the SysLINK via your web browser. If you still want to access the SysLINK, you will need to configure a Remote Management server before disabling the Web Server.
Alternately, you can regain access to the web configuration interface by using the hardware reset button to restore the default configuration. Note that this will discard all your configuration settings.
Any changes you make here will take effect after the next reboot.
Save Changes

Security Log

The security log records security events. These include logins, changes to code, configuration, or file system (FS). Both successful and failed events are logged along with the timestamp of the event. The log is stored in non-volatile memory. You may view or save the log but may not clear the log.

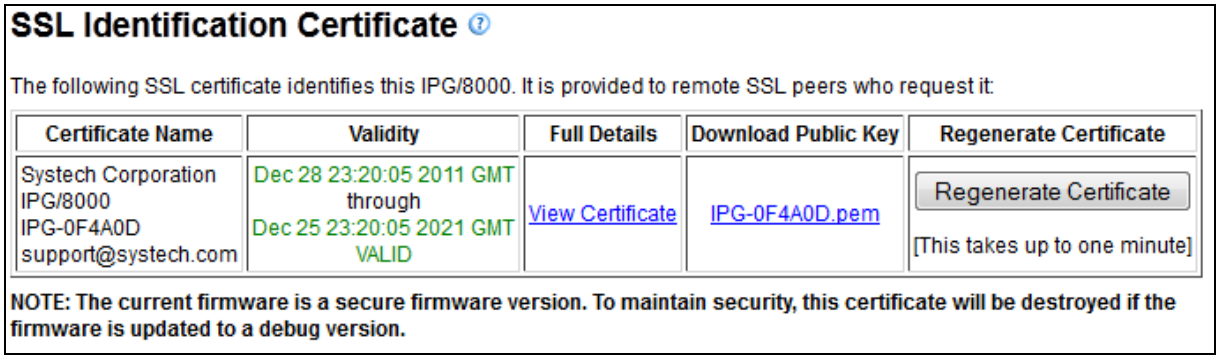
Click View to display the log (example below). Click Save to save the log to a file. You may also configure the Online Update to periodically send the log to an update host.

Security Log

Sequence #	Date	Status	Source	Event
1	Mon Sep 26 16:00:35 2011	Success	admin	Login
2	Mon Sep 26 16:12:45 2011	Success	admin	Code Change
3	Wed Oct 05 17:13:52 2011	Success	admin	Code Change
4	Fri Oct 07 23:17:07 2011	Success	admin	Local config change (1)
5	Sun Oct 09 23:17:54 2011	Success	admin	Code Change
6	Fri Jan 20 21:56:29 2012	Success	Hard reset	Restore Defaults
7	Fri Jan 20 22:04:59 2012	Success	admin	Local config change (1)
8	Mon Jan 23 19:49:02 2012	Success	admin	Code Change
9	Mon Feb 27 22:45:08 2012	Failure	dceadmin	Login
10	Mon Feb 27 22:46:24 2012	Success	admin	Code Change
11	Mon Feb 27 22:49:01 2012	Success	admin	Local config change (1)
12	Tue Feb 28 01:13:56 2012	Success	admin	Local config change (1)
13	Tue Feb 28 18:22:37 2012	Success	admin	FS change
14	Wed Feb 29 00:43:21 2012	Success	admin	Local config change (1)
15	Tue Mar 27 17:49:20 2012	Failure	dceadmin	Login
16	Tue Mar 27 17:49:46 2012	Success	admin	Login
17	Tue Mar 27 17:49:47 2012	Success	admin	Config file load
18	Tue Mar 27 17:52:28 2012	Success	admin	Local config change (1)
19	Tue Mar 27 17:57:36 2012	Success	admin	Config file load
20	Tue Mar 27 17:59:12 2012	Success	admin	Local config change (1)

SSL Security Certificates

This page displays two sets of SSL certificates – the unit's Identification Certificate and a list of SSL peer and Certifying Authority certificates.


SSL Identification Certificate
The following SSL certificate identifies this IPG/8000. It is provided to remote SSL peers who request it:
Certificate Name
Validity
Full Details
Download Public Key
Regenerate Certificate
Systech Corporation
IPG/8000
IPG-0F4A0D
support@systech.com
Dec 28 23:20:05 2011 GMT
through
Dec 25 23:20:05 2021 GMT
VALID
View Certificate
IPG-0F4A0D.pem
Regenerate Certificate
[This takes up to one minute]
NOTE: The current firmware is a secure firmware version. To maintain security, this certificate will be destroyed if the firmware is updated to a debug version.

The SSL identification certificate identifies unit to remote SSL peers. During initialization, the unit checks to see if an identification certificate exists. If not, it automatically generates one and keeps it secure.

The public key portion of this certificate can be used by remote SSL servers to uniquely identify the unit. This is sometimes known as client-side SSL authentication. To configure client-side authentication on your server, perform one of the following steps:

- Download the public key from the unit using the Download Public Key link and add it to your SSL server's list of trusted SSL peers.
- Use the Register/Install link to send the certificate to an HTTP server which supports registration.

All SSL identity certificates have a private key which must be kept secret in order to guarantee SSL security. The unit's firmware protects this private key by hiding it in internal memory and never letting its contents leave the device. However, note that debug versions of firmware remove these protections. In order to maintain the security of past and future SSL transactions, the private key is destroyed whenever switching from secure production firmware to debug firmware, and vice versa.

If the private key is destroyed by new firmware, the unit will automatically create a new identity certificate after reboot. This new certificate must then be re-registered with your SSL server(s).

Trusted SSL Peers and Certifying Authorities

The following table lists all the SSL peers and Certifying Authorities which are trusted by this IPG/8000:

Certificate Name	Validity	Full Details
Digital Signature Trust Co. DSTCA E1	Dec 10 18:10:23 1998 GMT through Dec 10 18:40:23 2018 GMT VALID	View Certificate
Digital Signature Trust Co. DSTCA E2	Dec 9 19:17:26 1998 GMT through Dec 9 19:47:26 2018 GMT VALID	View Certificate
SecureTrust Corporation SecureTrust CA	Nov 7 19:31:18 2006 GMT through Dec 31 19:40:55 2029 GMT VALID	View Certificate
Digital Signature Trust Co. DST-Entrust GTI CA	Dec 9 00:02:24 1998 GMT through Dec 9 00:32:24 2018 GMT VALID	View Certificate
GeoTrust Inc. GeoTrust Global CA	May 21 04:00:00 2002 GMT through May 21 04:00:00 2022 GMT	View Certificate

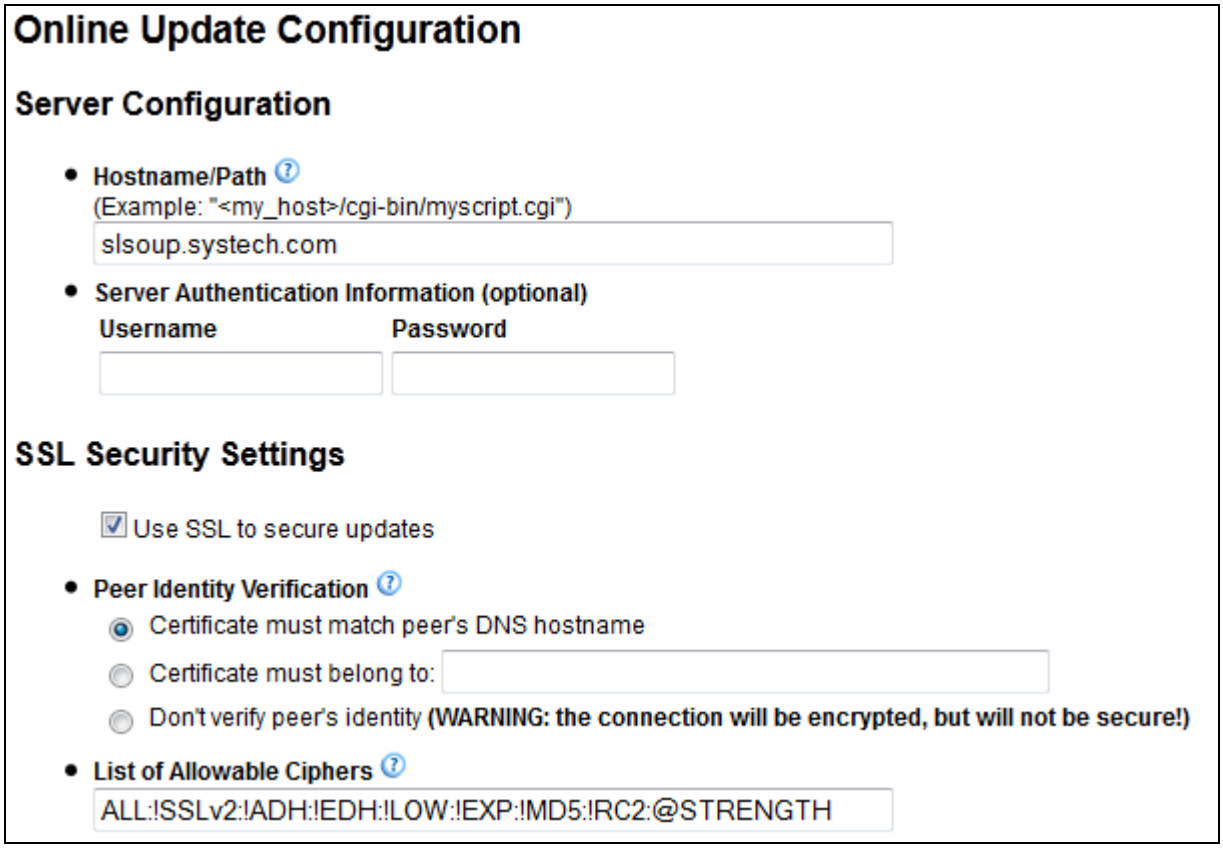
This list defines which SSL peers are trusted by this unit. When establishing an SSL connection with an SSL peer, the unit checks this list to see if the peer's SSL certificate is either: 1) in this list; or 2) signed by a certificate in this list. If so, the SSL peer is deemed to be trusted and the SSL session is allowed to continue.

By default, this list is loaded with a number of popular Certifying Authorities (CAs) who sign and issue SSL certificates to Internet hosts. To change the contents of this list, contact customer support.

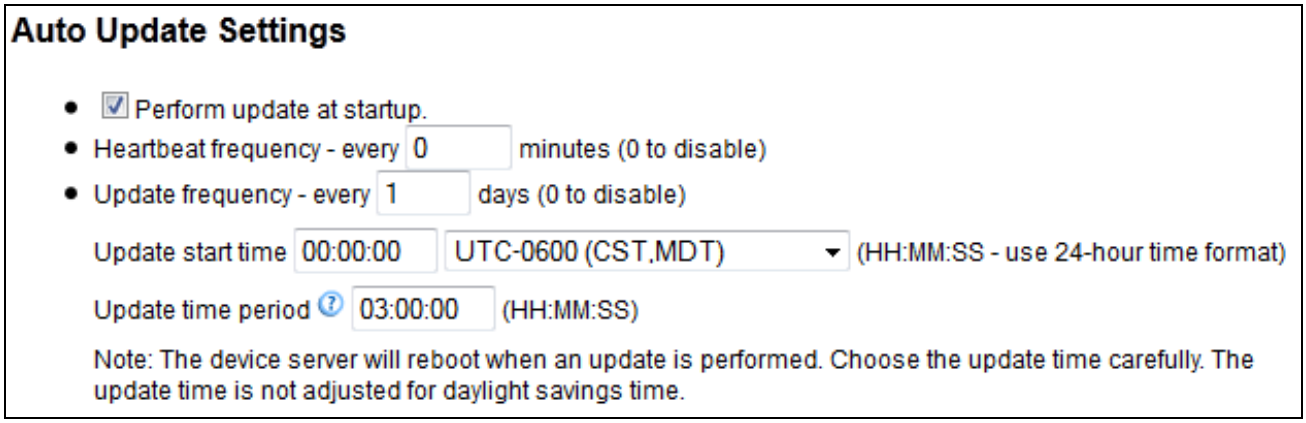
Online Update

You may configure your gateway to make a connection to an update server and obtain updated software or configuration information from the server or send information to the server. If your gateway supports SSL, this update may be over a secure SSL connection. You may schedule the updates to happen periodically, or on every startup, or only when manually selected. The automatic update capability can be used along with Network Isolation to provide a way for the gateway to "call out" to get updates if all the incoming connections are disabled.

To configure updates, first, select the update server to use and the SSL parameters for connecting to it. You may specify both the server name and the path for obtaining the updates. If the server requires HTTP authentication from the gateway, specify the username and password to use.



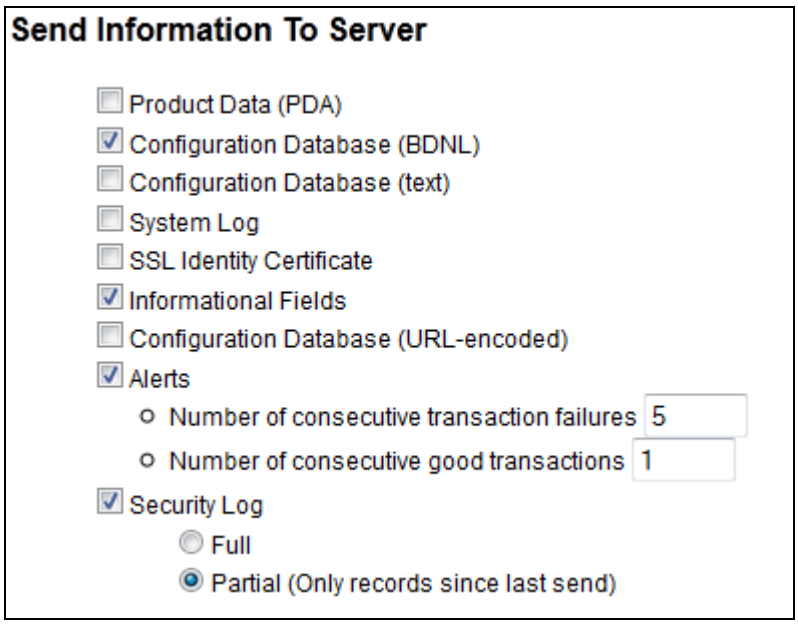
Then select when and what to update. Select "Perform update at startup" to have the gateway check for updates every time it is booted. (Note: this will cause the startup to take longer than normal. Do NOT interrupt the unit when it is updating or flash memory may be corrupted. The unit will blink the status LED at four times the normal rate when it is updating flash.) Or select a frequency and time of day to periodically check for updates.


Auto Update Settings
Perform update at startup.
Heartbeat frequency - every 0 minutes (0 to disable)
Update frequency - every 1 days (0 to disable)
Update start time 00:00:00 UTC-0600 (CST,MDT) (HH:MM:SS - use 24-hour time format)
Update time period 03:00:00 (HH:MM:SS)
Note: The device server will reboot when an update is performed. Choose the update time carefully. The update time is not adjusted for daylight savings time.

Then configure which items to send to the server or update from the server.

Send Information To Server:

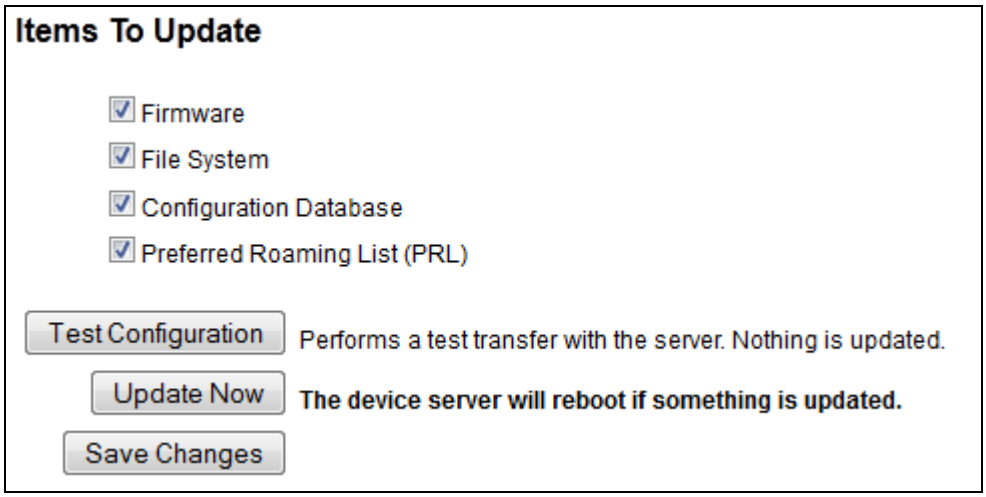
- Product Data – manufacturing configuration data, error records
- Configuration Database – current settings on the unit (BDNL, text or URL-encoded format)
- System Log – trace activity
- SSL Identity Certificate
- Informational Fields
- Alerts
    - Select the number of consecutive transaction failures to trigger a failure alert
    - Select the number of consecutive good transactions to trigger a subsequent success alert (after a transaction failure alert)
- Security Log – either the full log or only records changed since the last update.



Then configure which items to send to update from the server.

Items to Update:

- Operating Software – the software running in the unit
- File System – SSL certificates
- Current Configuration – current settings on the unit
- Preferred Roaming List (PRL) – available on some cellular units



Finally, you can

- Test Configuration – check to make sure the settings are right and the server is available. This will contact the server and go through the communication necessary to send and receive the files without actually doing so.
- Update Now – contacts the server and sends and updates the files now.
- Save Changes – save changes for later.

Lightweight Heartbeat Settings

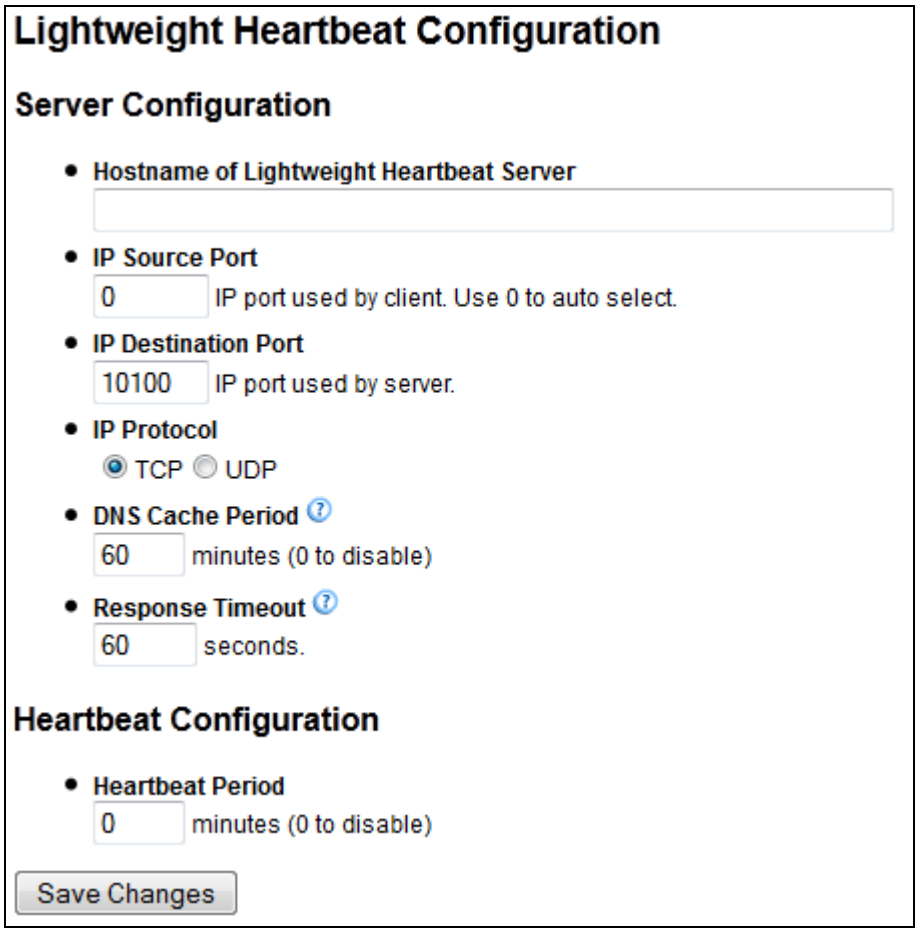
The Lightweight Heartbeat (LWHB) feature is designed to provide a low overhead method for units to check in more frequently than existing SOUP methods. This is particularly useful when used with cellular data plans that provide only a few MB of data per month. Full SOUP updates can be scheduled at most every day and have relatively high overhead (20-30Kbytes per update). SOUP heartbeats can be scheduled more often but still relatively high overhead (5-6K per heartbeat). The LWHB allows units to:

- Check in frequently - providing an "I'm up" indicator
- Check to see if there are further actions that should take place - like a full SOUP update

The LWHB server can record the source IP address which, in the cellular world can change multiple times a day

LWHB does not use SSL. It connects to a server using either UDP or TCP (configurable) on a configurable port number. The local IP port can also be configured if necessary to receive replies from the server through a firewall.

Using UDB, each LWHB takes about 60 bytes. Using TCP, each LWHB takes about 650 bytes. You must also take into account periodic DNS lookups for the hostname.



Specify the **Hostname** (or IP address), **IP Destination Port** and **IP Protocol** of the LWHB server. Typically the **IP Source Port** should be 0, allowing the unit to use the next available port.

The Lightweight Heartbeat client remembers the IP address of the server so that it does not need to perform a DNS lookup for each heartbeat. The **DNS Cache Period** specifies how long the server IP address is remembered before performing another DNS lookup. If a heartbeat should fail to contact the server, then a DNS lookup is forced for the next attempt.

The **Heartbeat Period** defines how often to send a LWHB message.

A server response is optional, so the server may just hangup (TCP). For TCP, the client detects the hangup and ends the heartbeat, but for UDP, the LWHB client wait for **Response Timeout** seconds for any possible response.

If the server does respond, the response is a single string of comma-separated messages or commands.

Response	Definition
"S"	Perform a full SOUP update action.
"C"	Perform a SOUP configuration database update action.
"P"	Perform a SOUP PRL update action.
"O"	Perform an Over-the-air (OTA) PRL update.
"R"	Reboot the unit.
"DR"	Disable Remote Management
"ER"	Enable Remote Management (must already be configured)
"Dn"	Disable Remote Port Access on port n
"En"	Enable Remote Port Access on port n (must already be configured)

Example: the following response string will cause the unit to do a SOUP update and enable Remote Management:

C,R

Cellular Settings

On units with Cellular modules, a Cellular Settings page is available to view the status of the cellular module and, in some cases, change some settings. The following is an example of the type of information available. This may vary depending on the module.

Cellular Modem

Module Information

Parameter	FW2770P
Hardware Version	OK
Software Version	8.5.17
Electronic Serial Number (ESN) / MEID	8010F6A9, A10000157F8100
International Mobile Station ID (IMSI)	000000000001234
Mobile Station IP Address Mode (MIP Mode)	1 (Mobile IP Preferred)
Preferred Roaming List ID (PRL ID)	52296
Roam Preference	3 (Automatic B)
Roaming State	1 (Home)
Signal Strength	-84 dBm (83%)
Network Provisioning Status	Inactive
Main Cell Environment	6915,6,3,507,376,4,54,2,-82,30,-150,0
Network Carrier	Verizon

One some modules you may set the Service Programming Code (sometimes also called the Master Subsidy Lock – MSL – or Alternative Lock). Under most circumstances this value is not used. For some operations, like reconfiguration, it is used to reset values in the module.

Module Configuration

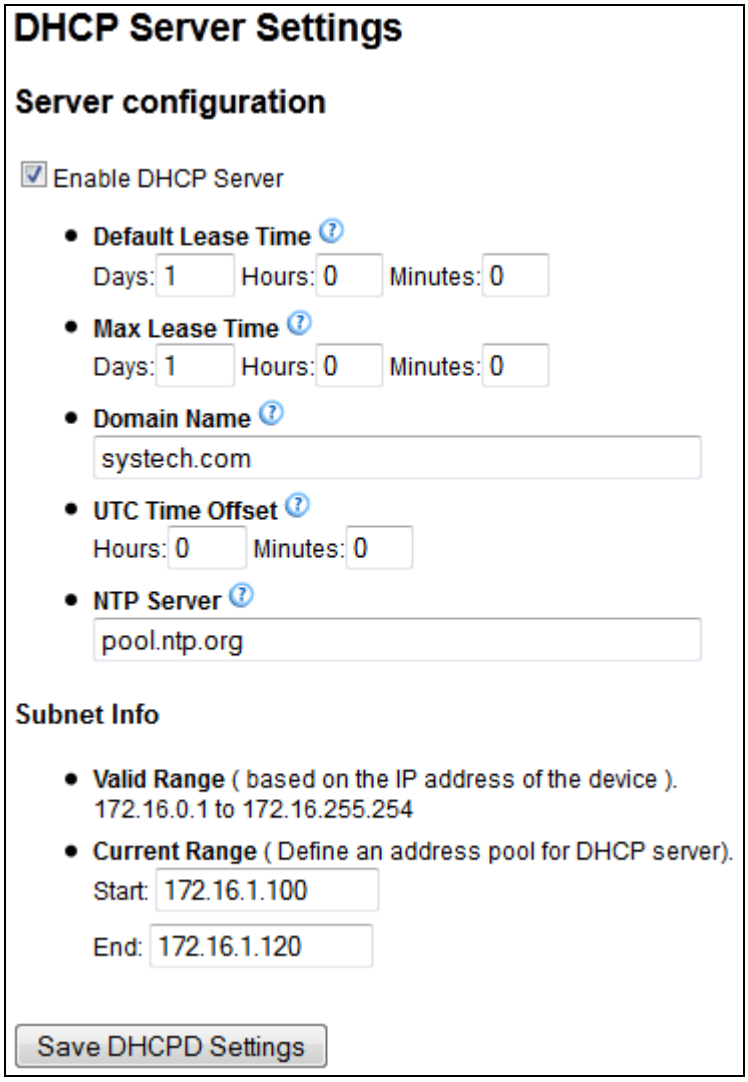
- **FW2770P Service Programming Code (SPC)**

  000000 Use the Master Subsidy Lock (MSL) or Alternative Lock value.

Save Changes

DHCP Server Management

Some units may be configured to act as a DHCP server.



Default Lease Time should be the length that will be assigned to a lease if the client requesting the lease does not ask for a specific expiration time.

Max Lease Time should be the maximum length that will be assigned to a lease.

Domain Name (optional) should be the domain name that will be appended to the client's hostname to form a fully-qualified domain-name (FQDN).

UTC Time Offset specifies the offset of the client's subnet from Coordinated Universal Time (UTC).

NTP Server (optional) specifies the IP address indicating an NTP (RFC 1035) server available to the client.

When the DHCP service is running, the DHCP Status section displays any messages from the service.

Accessing the Gateway from a Remote Network

When attaching TCP/IP devices to a local Ethernet network, all that is required for basic communication is to assign an IP address to the network device. However, if your network devices need to communicate with remote networks, you must also configure IP routing information to tell TCP/IP where to send these remote network packets.

A remote network is a network that must be reached via one or more routers. To send packets to a remote network, you must configure the following information:

1. **IP Netmask:** The IP netmask defines how your network is subnetted. See the section called **IPv4 Netmask** for more information.
2. **IP Routes:** The IP routes define where your routers are and when to use them. See the section called **IP Routing** for more information.

Chapter 3: Troubleshooting and Updating

There are a number of tools built into the gateway to facilitate troubleshooting problems and managing the unit. These are accessible via the web browser interface under the menu sections **Status and Logs** and **Commands**.

- **Troubleshooting** displays high level information about transactions
- **System Log** displays informational and error messages from the unit and can also be configured to display debug trace data
- **OS Task Information** displays the state of the onboard software tasks
- Error! Reference source not found. displays the status of network services and current connections
- Error! Reference source not found. displays the status of the currently active network interfaces
- **Port Status** displays the current state of the port(s)
- **Log/Debug Settings** configures the type of trace data to collect in the System Log
- **Ping** can be used to test network connections
- **Reset/Reboot** can be used to clear errors on individual ports or to reboot the gateway
- **Flash Management** allows you to update the unit's software, save and update configuration information, and manage the error history of your gateway

Troubleshooting

The troubleshooting section displays high level information about transactions. Example:

Troubleshooting (Wed, 11 Apr 2012 23:23:52 UTC)

This page summarizes the significant events that occurred during recent protocol transactions. Transaction results are listed here starting with the most recent transaction first.

More detailed information about system activity can be found in the System Log.

Transaction #248 on Terminal

Start time = Wed, 11 Apr 2012 19:00:27 UTC.

[+000.000s] The attached device dialed '**18664334608**'. The phone number was successfully translated.

[+000.122s] The DNS lookup for **atm.columbusdata.net** resulted in **206.160.136.204**.

[+000.242s] An outgoing network connection to **206.160.136.204:6963** was successfully established.

[+000.245s] Attempting to negotiate a secure SSL session.

[+000.253s] Doing protocol conversion for **Simple 7E (Simple POS)**.

[+000.874s] An SSL session was established using the following ciphers:

```
RC4-SHA                 SSLv3 Kx=RSA      Au=RSA  Enc=RC4(128)  Mac=SHA1
```

[+000.876s] The peer's SSL certificate was issued by:

```
US
Thawte, Inc.
Thawte SSL CA
```

[+000.876s] The peer's SSL certificate belongs to: **atm.columbusdata.net**.

[+001.973s] A modem connection was established on the Terminal port at **2400** baud [V.14 Connection].

[+003.883s] **ENQ** was sent to the terminal.

[+004.895s] A **157** byte packet was received from the terminal.

[+005.075s] A **187** byte packet was sent to the terminal.

[+006.045s] **ACK** was received from the terminal.

[+006.181s] **EOT** was sent to the terminal.

[+006.335s] **EOT** was received from the terminal.

[+006.719s] **Terminal** ended the transaction.

[Transaction COMPLETED]

System Log

By default, the gateway stores informational and error messages in the system log. You can also configure the gateway to record debug trace data in this system log buffer (see the section entitled **Log/Debug Settings**). To display the system log and trace information in your browser window, select the **System Log** link in the menu:

```
[System boot time was Tue, 10 Apr 2012 18:27:16 UTC]
[Timestamp format is "(D)HH:MM:SS.<usecs>" UTC, D is days since boot time]
[Timestamp granularity is 1000.0 kHZ (ticks are 100 HZ)]
[SLK/1100UU - 02D.17A_D (built Mar 22 2012 10:13:30 UTC) - 00:80:44:0F:06:C2]
[LogMask 0x00000000/0x00000000]
(0)00:00:23.937910 [INFO   ] (4042C490) Config is OK
(0)00:00:25.693982 [ssl    ] (4015C490) st_SSL_InitTask: Waiting for identity certificate.
(0)00:00:25.697047 [INFO   ] (4008B000) Initializing transaction logging (supporting 100 events).
(0)00:00:25.715877 [ssl    ] (4015C490) st_SSL_InitTask: Initializing master SSL context.
(0)00:00:25.887517 [ssl    ] (4015C490) The SSL library has been initialized.
(0)00:00:26.172810 [INFO   ] (40124000) LED/Port Manager started.
(0)00:00:26.184264 [ssl    ] (40159490) st_SSL_InitTask: Waiting for identity certificate.
(0)00:00:26.190956 [ssl    ] (40159490) st_SSL_InitTask: Initializing master SSL context.
(0)00:00:26.318620 [ssl    ] (40159490) The SSL library has been initialized.
(0)00:00:26.332448 [INFO   ] (40151000) TCP KeepAlive set to 60 seconds.
(0)00:00:26.338913 [INFO   ] (40151000) Setting system IP address to ac100a2f@
(0)00:00:26.339882 [INFO   ] (40151000) Setting system IP netmask to ffff0000@
(0)00:00:26.348650 [INFO   ] (40151000) Old IP address 0@ is changing.
(0)00:00:26.415981 [INFO   ] (40151000) Added route to 0@
(0)00:00:26.416334 [INFO   ] (40151000)     via gateway ac100101@.
(0)00:00:26.428674 [INFO   ] (40151000) Registered 1 NTP server(s) from the configuration database.
(0)00:00:27.361322 [INFO   ] (40124000) Ethernet network connected at 100 Mbps
(0)00:00:27.685422 [ssl    ] (40477490) st_SSL_InitTask: Waiting for identity certificate.
(0)00:00:27.692040 [ssl    ] (40477490) st_SSL_InitTask: Initializing master SSL context.
(0)00:00:27.820620 [ssl    ] (40477490) The SSL library has been initialized.
(0)00:00:27.822778 [INFO   ] (40159490) TCP/IP started.
(0)00:00:27.826243 [dhcp   ] (40159490) Checking DHCP state...
(0)00:00:27.829520 [dhcp   ] (40159490) Checking DHCP state...
(0)00:00:27.831526 [INFO   ] (40477490) Remote System Monitor has started (ID 1078424720).
(0)00:00:28.724091 [INFO   ] (400D3490) System Log daemon listening (0 connects)
(0)00:00:28.942229 [sdp    ] (400EC490) sdp_set_etherroute: enabling
(0)00:00:28.944384 [INFO   ] (400EC490) The SDP IPv4 daemon has been (re)started.
(0)00:00:28.947097 [INFO   ] (400F4490) The SDP IPv6 daemon has been (re)started.
(0)00:00:29.381648 [ssl    ] (401C9490) st_SSL_InitTask: Waiting for identity certificate.
(0)00:00:29.388069 [ssl    ] (401C9490) st_SSL_InitTask: Initializing master SSL context.
(0)00:00:29.518253 [ssl    ] (401C9490) The SSL library has been initialized.
(0)00:00:29.622905 [portsrv] (40152000) port Resetting service on TCP minor 0.
(0)00:00:29.623971 [portsrv] (40152000) port SSE_ResourceAcquire: Tenant -1
(0)00:00:29.625024 [portsrv] (40152000) port SSE_ResourceAcquire: Resource has no tenants.
(0)00:00:29.626184 [portsrv] (40152000) port _SSE_ResourceReset: Tenant 0 = TCP PIPE
(0)00:00:29.627234 [portsrv] (40152000) port SSE_StartThread: Starting thread SSE 18:0
(0)00:00:29.628744 [portsrv] (40152000) port Resetting service on TCP minor 1.
(0)00:00:29.629703 [portsrv] (40152000) port SSE_ResourceAcquire: Tenant -1
(0)00:00:29.630349 [portsrv] (40152000) port SSE_ResourceAcquire: Resource has no tenants.
(0)00:00:29.630692 [portsrv] (40152000) port _SSE_ResourceReset: Tenant 0 = TCP PIPE
```

This will open a connection to the gateway that will display the current contents of the system log buffer. As long as you keep this window open in your browser, new messages added to the buffer will automatically be sent to your web browser.

Log entries begin with a timestamp. The first item "(0)" is the number of days since the unit was booted. The next 12 digits are the time in UTC time including microseconds.

Click the "save" link next to System Log to save the log as an HTML file. Click the "clear" link next to System Log to clear the log.

You can also view and save the system log using a telnet client. To do this, connect to the IP address of your gateway on TCP port 9096. Data in the trace buffer will be automatically formatted and displayed in your telnet window. For example:

```
telnet 192.168.1.1 9096
```

You can also use the r4000 host utility –s or –t options. –s gets the current contents of the trace log then quits and –t gets the log continuously.

Serious System Error Codes

If your gateway encounters a serious system error, it will display an error condition on the status LED and attempt to log an error code to the system log. For more information on the LED conditions, see the **Hardware Manual**.

The error message recorded to the system log will look similar to the following:

```
382 log-error[10]: Serious system error 1
```

The serious system error codes are defined in Table 3-1.

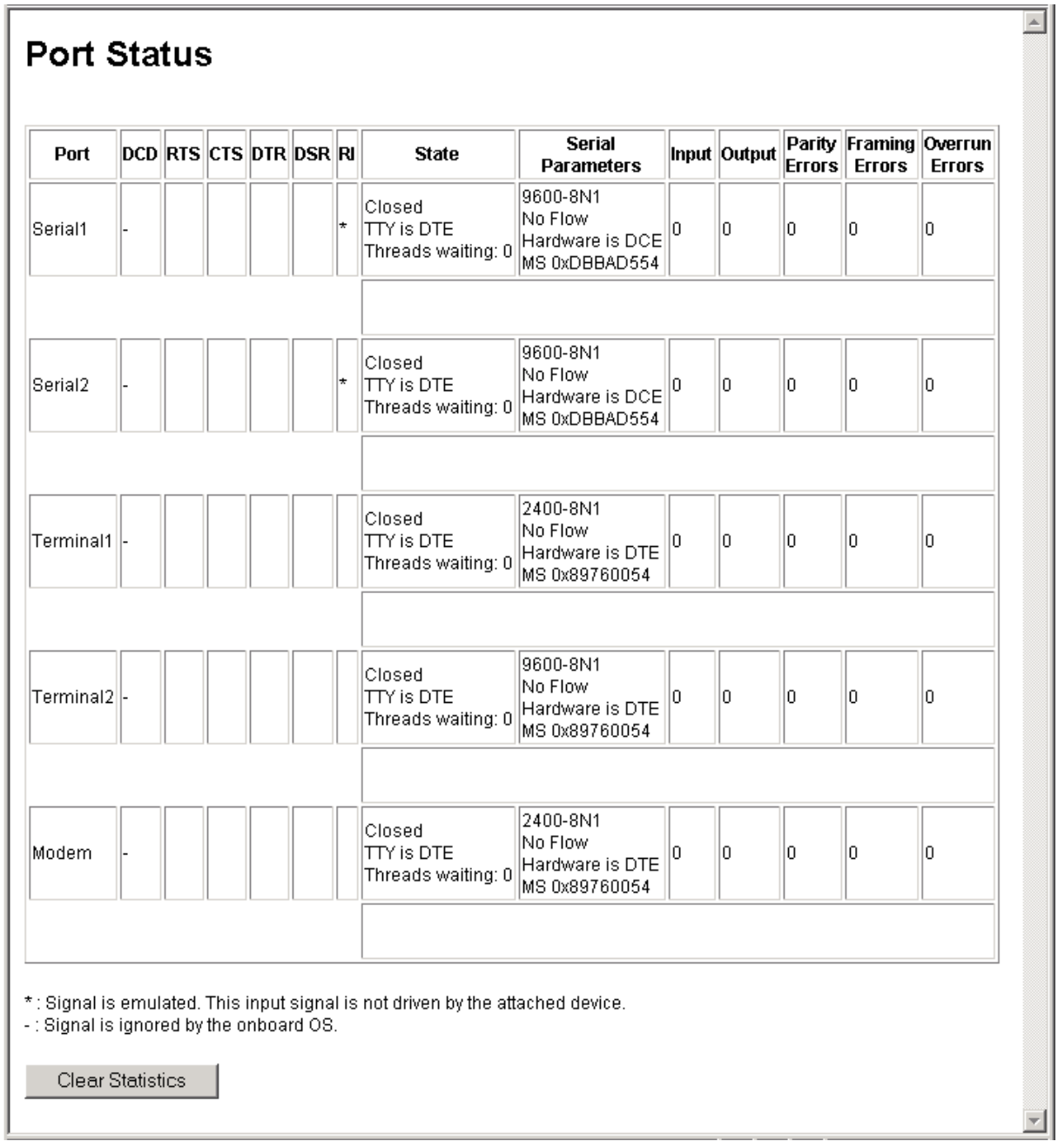
Error Code	Meaning	Action
1	Ethernet MII communication error	Call Systech support
2	Corrupt configuration database.	Restore the default configuration
4	Unknown backplane ID	Call Systech support
8	Unknown network module	Call Systech support
16	Missing or bad DSP device	Call Systech support

Table 3-1: Serious System Error Codes

The actual error code may be a combination (sum) of these.

Port Status

The **Port Status** page shows the current state of the port(s):



Port Status

Port	DCD	RTS	CTS	DTR	DSR	RI	State	Serial Parameters	Input	Output	Parity Errors	Framing Errors	Overrun Errors
Serial1	-					*	Closed TTY is DTE Threads waiting: 0	9600-8N1 No Flow Hardware is DCE MS 0xDBBAD554	0	0	0	0	0
Serial2	-					*	Closed TTY is DTE Threads waiting: 0	9600-8N1 No Flow Hardware is DCE MS 0xDBBAD554	0	0	0	0	0
Terminal1	-						Closed TTY is DTE Threads waiting: 0	2400-8N1 No Flow Hardware is DTE MS 0x89760054	0	0	0	0	0
Terminal2	-						Closed TTY is DTE Threads waiting: 0	9600-8N1 No Flow Hardware is DTE MS 0x89760054	0	0	0	0	0
Modem	-						Closed TTY is DTE Threads waiting: 0	2400-8N1 No Flow Hardware is DTE MS 0x89760054	0	0	0	0	0

* : Signal is emulated. This input signal is not driven by the attached device.
- : Signal is ignored by the onboard OS.

Clear Statistics

The **DCD**, **RTS**, **CTS**, **DTR**, **DSR**, and **RI** columns indicate the status of the modem signals for the specified port. If the modem signal is present (either asserted if it is an outgoing signal, or detected if it is an incoming signal) its name will appear in the corresponding column.

The **State** column indicates whether the port is open, closed, waiting for DCD, or experiencing any notable conditions (such as flow control). The **Serial Parameters** column indicates the current settings for the port.

> **NOTE:** The **Serial Parameters** column reflect the actual, real-time serial settings in use by the port. The settings that are specified via the serial configuration pages are applied each time the port is opened. If the port is closed, the serial parameters reported by **Port Status** may not necessarily match the settings you configured until the port is re-opened. Furthermore, some clients can override the configured settings.

The **Input**, **Output**, **Parity Errors**, **Framing Errors**, and **Overrun Errors** columns are tallies of activity on the port.

Under each port row is a field indicating the current TCP connection status on the port.

The display will update automatically every few seconds. You can stop the automatic update by selecting "Stop" from your browser. To restart the updating, select "Refresh" or "Reload" from your browser.

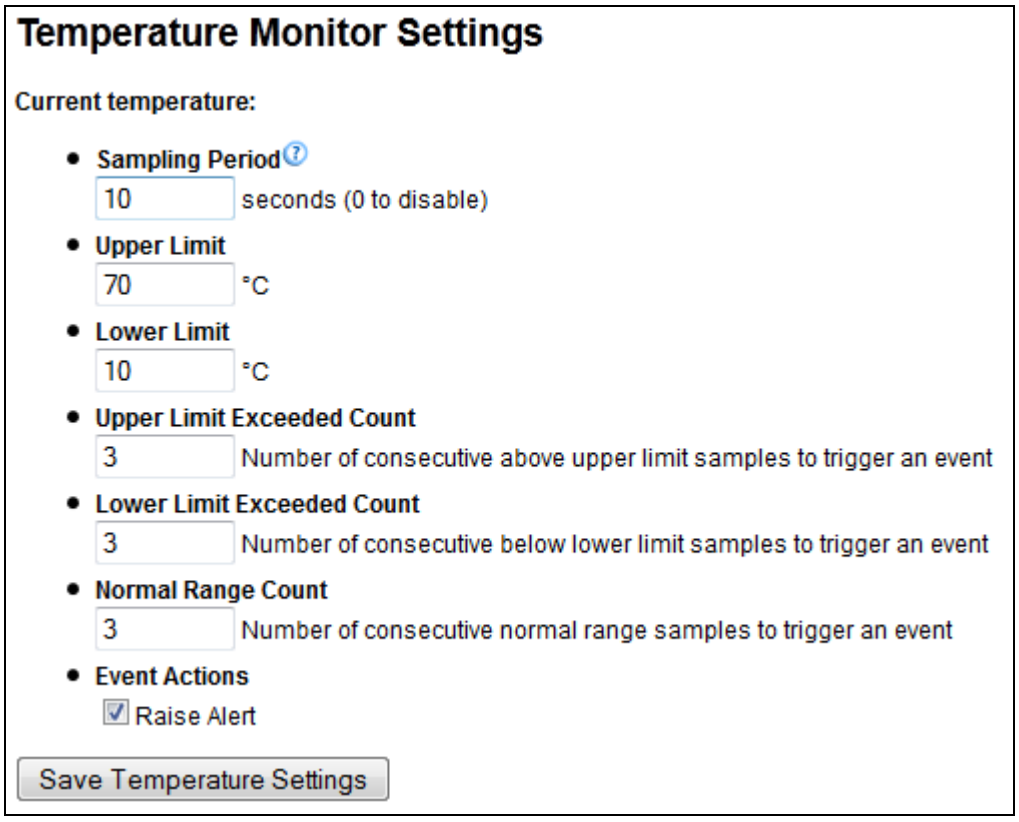
OS and Network Information

The **OS and Network Information** page shows the current state of system and application tasks as well as memory usage information and displays the status of network services and current connections. This may include:

- OS Information
  - CPU Information
  - Memory Information
  - Filesystem Information
- Network Information
  - TCP Sockets – established connections and listeners
  - UDP Listeners – UDP ports the unit is listening on
  - Network Interfaces
  - Current Route Table
  - Network Interface Statistics

Temperature Monitor Settings

On units with temperature monitoring hardware, the following page is present.



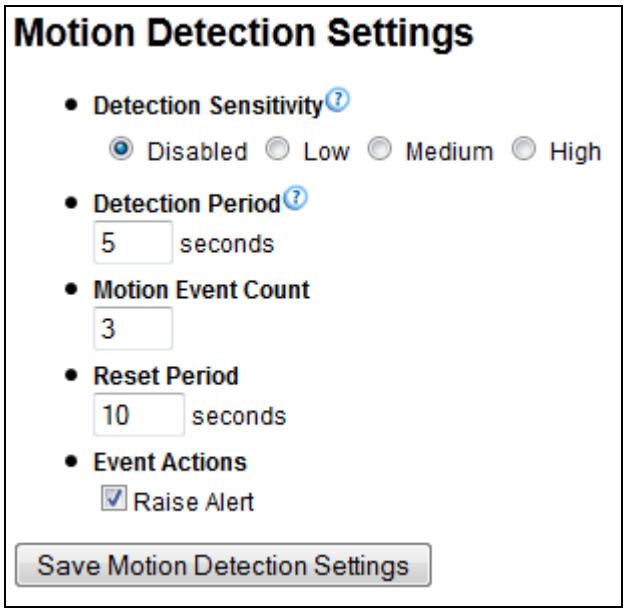
The sampling period determines how often the temperature monitor takes a temperature reading. This period, combined with the counts, determines the amount of time and

hysterisis in triggering over and under temperature events and return to normal temperature events.

An event is currently defined as an Alert which is sent to the SOUP server.

Motion Detection Settings

On units with motion monitoring hardware, the following page is present.



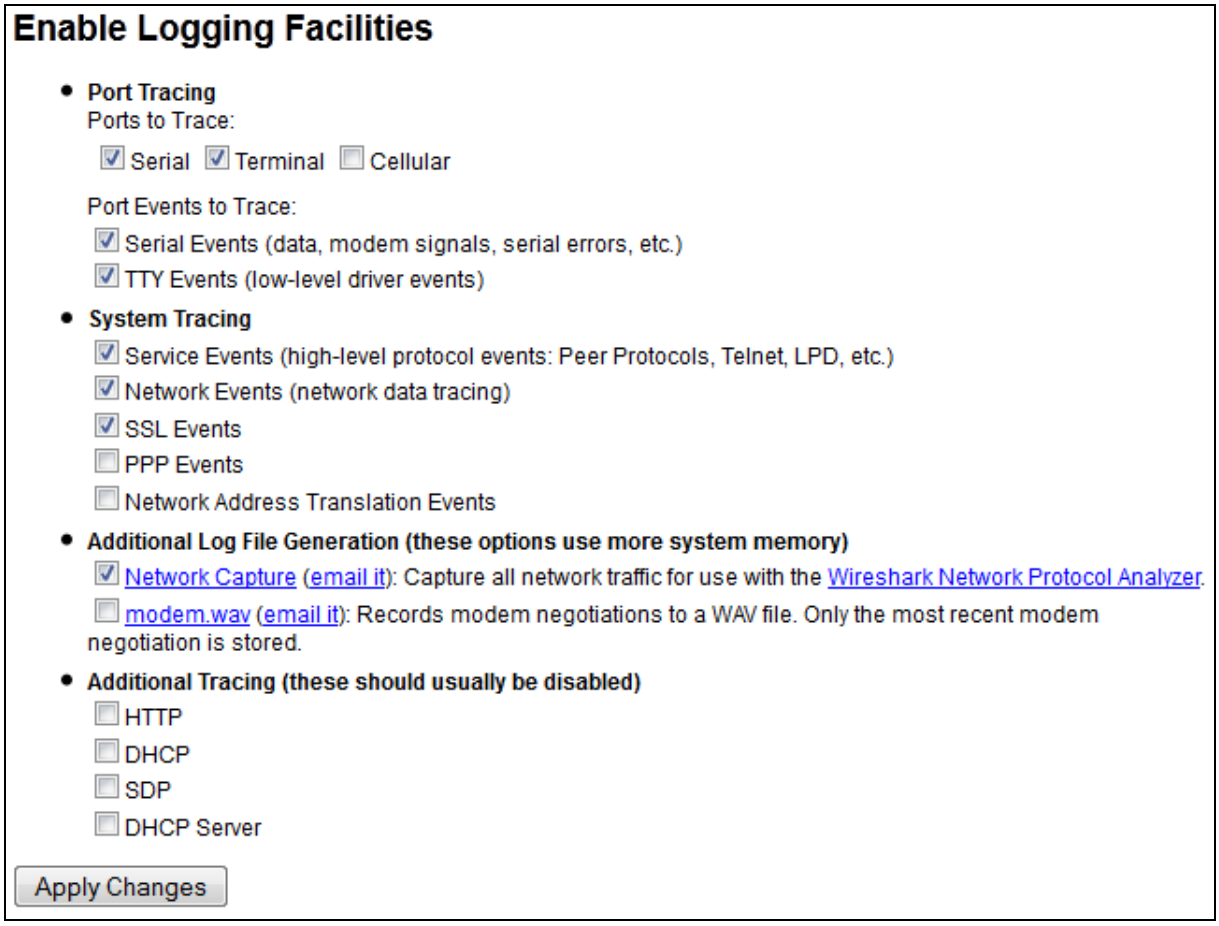
The detection sensitivity determines how much motion is needed to generate a motion event. The motion detection sensitivity can be chosen from a predefined list of values. Choices are Disabled, Low, Medium, and High.

A motion event action occurs when the number of motion events (or more) occurs during the detection period. After a motion event action occurs, any additional motion events will be ignored for the reset time period.

An event is currently defined as an Alert which is sent to the SOUP server.

Log/Debug Settings

By default, the gateway stores informational and warning messages in the system log. You can also configure the gateway to save trace data in this system log buffer:


Enable Logging Facilities
Port Tracing
Ports to Trace:
Serial
Terminal
Cellular
Port Events to Trace:
Serial Events (data, modem signals, serial errors, etc.)
TTY Events (low-level driver events)
System Tracing
Service Events (high-level protocol events: Peer Protocols, Telnet, LPD, etc.)
Network Events (network data tracing)
SSL Events
PPP Events
Network Address Translation Events
Additional Log File Generation (these options use more system memory)
Network Capture (email it): Capture all network traffic for use with the Wireshark Network Protocol Analyzer.
modem.wav (email it): Records modem negotiations to a WAV file. Only the most recent modem negotiation is stored.
Additional Tracing (these should usually be disabled)
HTTP
DHCP
SDP
DHCP Server
Apply Changes

Tracing is generally used for troubleshooting problems. You can enable tracing on individual ports – selecting low-level serial events or higher-level port service events (like telnet or LPD). Or you can enable tracing on system services such as HTTP (the web browser interface), DHCP, SDP (Systech Device Protocol - used by Systech utilities to find Systech gateways on the network), and SSL.

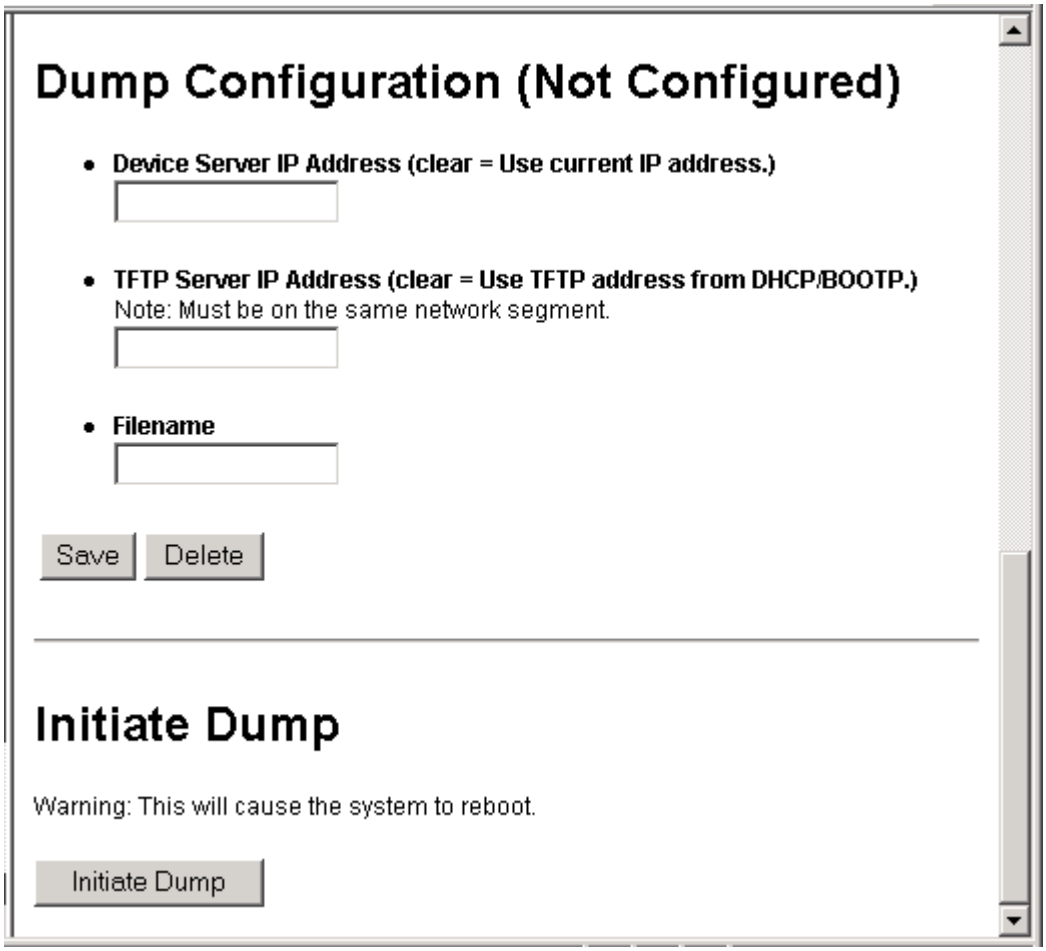
For port tracing, you must select both the port(s) and the events that you want to trace.

Note that unlike most other options, the logging configuration will not be saved after a reboot unless you explicitly check the **Remember this configuration after reboot** box.

Selecting "Record modem negotiations to WAV files" will record the latest modem negotiation from the Terminal ports (from the time it dials until it completes negotiation). This can then be saved to a standard WAV file for later analysis.

Refer to the chapter on **Troubleshooting and Updating** for information on how to access and capture the contents of the system log or the recorded modem data.

From the **Log/Debug** page you can also configure the unit to save a dump of system memory under some circumstances. Scroll the page down to the dump information:

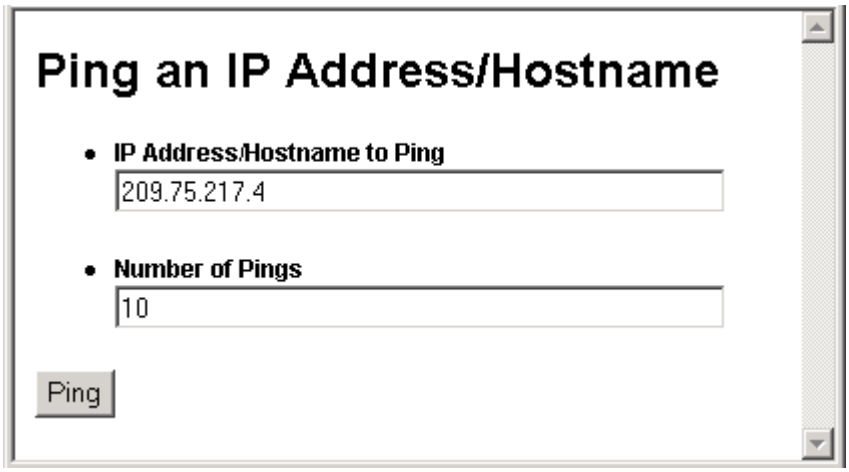

Dump Configuration (Not Configured)
Device Server IP Address (clear = Use current IP address.)
TFTP Server IP Address (clear = Use TFTP address from DHCP/BOOTP.)
Note: Must be on the same network segment.
Filename
Save
Delete
Initiate Dump
Warning: This will cause the system to reboot.
Initiate Dump

A memory dump may be obtained either manually using the **Initiate Dump** button on this page or pressing the reset button or automatically when the unit encounters a catastrophic error that causes it to reboot. No dump will occur with any of these methods unless the dump is first configured.

The **Device Server IP Address** specifies the IP address the unit should use as its own when initiating a dump. If left blank, the unit uses it's currently configured IP address. The **TFTP Server IP Address** and **Filename** specify the host and filename on that host to send the dump to. If the server address is left blank, the unit uses the TFTP server address obtained from DHCP. The filename must be specified. If any of these parameters are invalid at the time of the dump, the dump will be aborted. The filename must be that of a writeable file on the TFTP server. The two IP addresses must be on the same segment (the dump facility does not support routing). The r4000 utility can be used to configure and initiate a dump. This utility can also act as the TFTP server for this purpose.

Ping

You can use the **Ping** command to test a network connection:

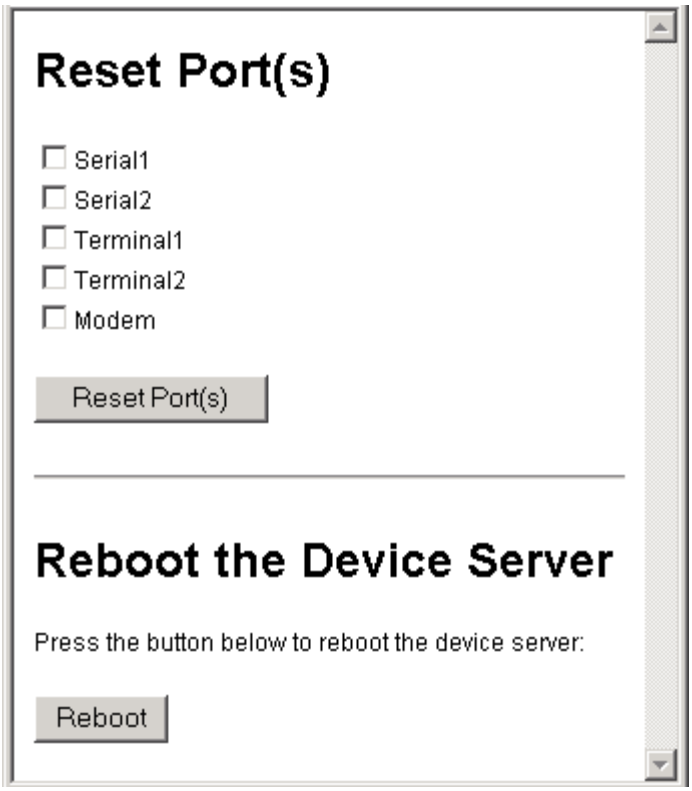


Enter the **IP address to Ping** or a **Hostname** and the **Number of Pings** then press the **Ping** button. The command will display the results as follows:

```
Sending 10 PINGs to 209.75.217.6...
Response from 209.75.217.6: icmp_seq=0, time=10.0 ms
Response from 209.75.217.6: icmp_seq=1, time=10.0 ms
Response from 209.75.217.6: icmp_seq=2, time=10.0 ms
Response from 209.75.217.6: icmp_seq=3, time=10.0 ms
Response from 209.75.217.6: icmp_seq=4, time=10.0 ms
Response from 209.75.217.6: icmp_seq=5, time=10.0 ms
Response from 209.75.217.6: icmp_seq=6, time=10.0 ms
Response from 209.75.217.6: icmp_seq=7, time=10.0 ms
Response from 209.75.217.6: icmp_seq=8, time=10.0 ms
Response from 209.75.217.6: icmp_seq=9, time=10.0 ms
10 packet(s) transmitted, 10 packet(s) received, 0% packet loss.
```

Reset/Reboot

The **Reset/Reboot** page lets you reset individual ports, or the entire gateway:

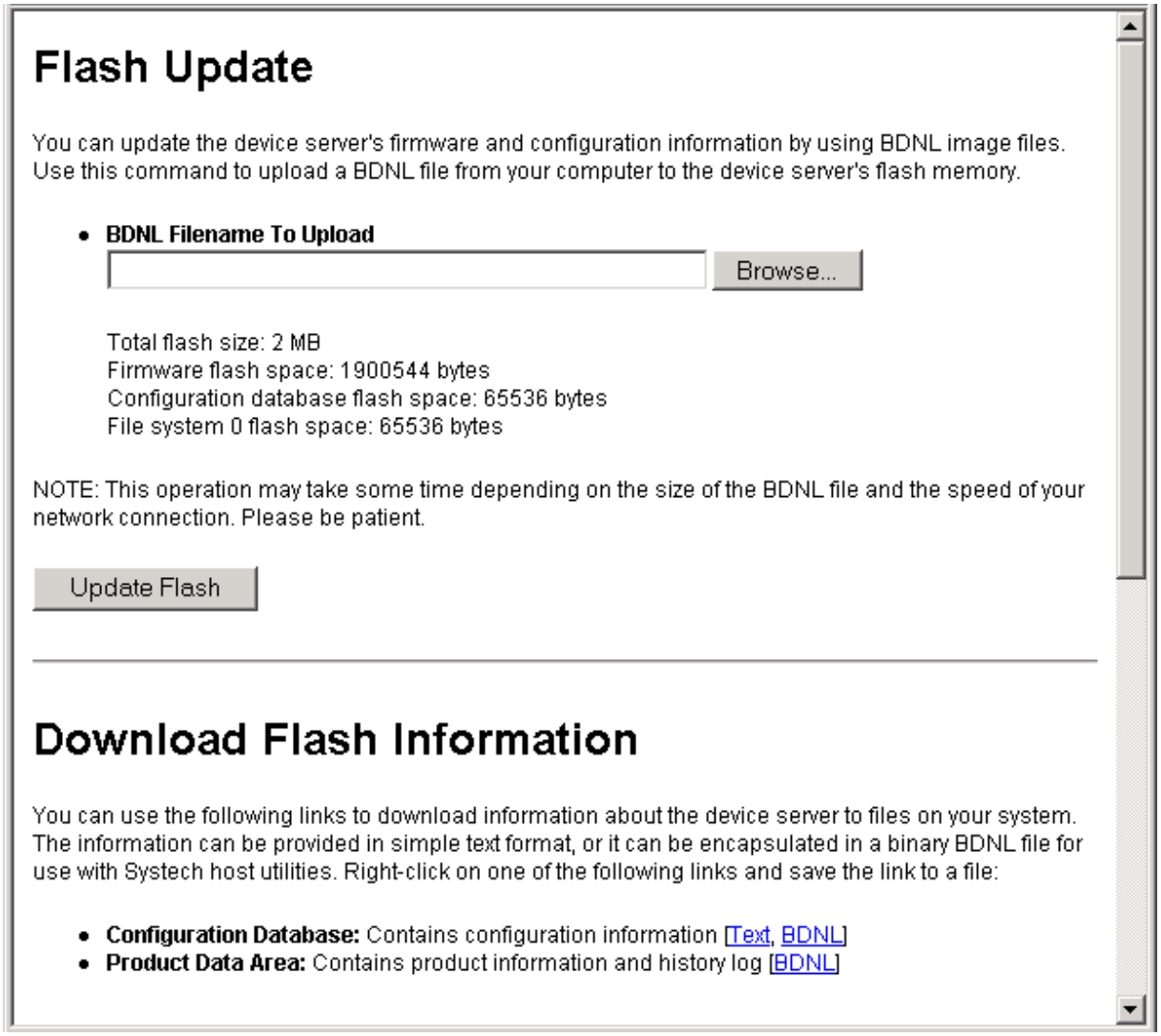


You can reset an individual port or ports by selecting the desired port(s) and pressing the **Reset Port(s)** button. This will kill whatever service was on the port and reset it back to the current configuration settings.

You may reboot the entire gateway by pressing the **Reboot** button. This is the equivalent of power cycling the unit.

Flash Management

The **Flash Management** page allows you to maintain your gateway's software, configuration information, and error history:


Flash Update
You can update the device server's firmware and configuration information by using BDNL image files. Use this command to upload a BDNL file from your computer to the device server's flash memory.
BDNL Filename To Upload
Browse...
Total flash size: 2 MB
Firmware flash space: 1900544 bytes
Configuration database flash space: 65536 bytes
File system 0 flash space: 65536 bytes
NOTE: This operation may take some time depending on the size of the BDNL file and the speed of your network connection. Please be patient.
Update Flash
Download Flash Information
You can use the following links to download information about the device server to files on your system. The information can be provided in simple text format, or it can be encapsulated in a binary BDNL file for use with Systech host utilities. Right-click on one of the following links and save the link to a file:
Configuration Database: Contains configuration information [Text, BDNL]
Product Data Area: Contains product information and history log [BDNL]

Flash Update

The **Flash Update** command allows you to update the gateway's software or configuration segment across the network. You can determine the gateway's software revision by looking at the **Welcome** page, or by using the **Port Server Utility**.

You will need ONE of the following tools on your local network to perform the update:

1. Web browser
2. Systech's **Port Server Utility** for Windows
3. Systech's command-line **r4000** utility (available for Windows and Unix systems)

To use the Web Browser, type in the BDNL filename to upload or click the Browse button to select the file from your local machine. Then click the Update Flash button. To use one of the Systech utilities, refer to the appropriate documentation.

During the time when the flash memory is being programmed, the status LED will blink at four times its normal rate. Do not interrupt or reboot the unit during this time.

> **CAUTION:** SPECIAL CARE MUST BE TAKING WHEN UPDATING THE SOFTWARE. REGARDLESS OF WHICH UPDATE METHOD YOU USE, DO NOT INTERRUPT THE UPDATE ONCE IT HAS BEGUN. LOSING POWER DURING THE UPDATE WILL RISK CORRUPTING THE SOFTWARE IMAGE AND MAKING THE GATEWAY UNUSABLE. If this does happen, call Systech to arrange for the gateway to be returned and reprogrammed at the factory.

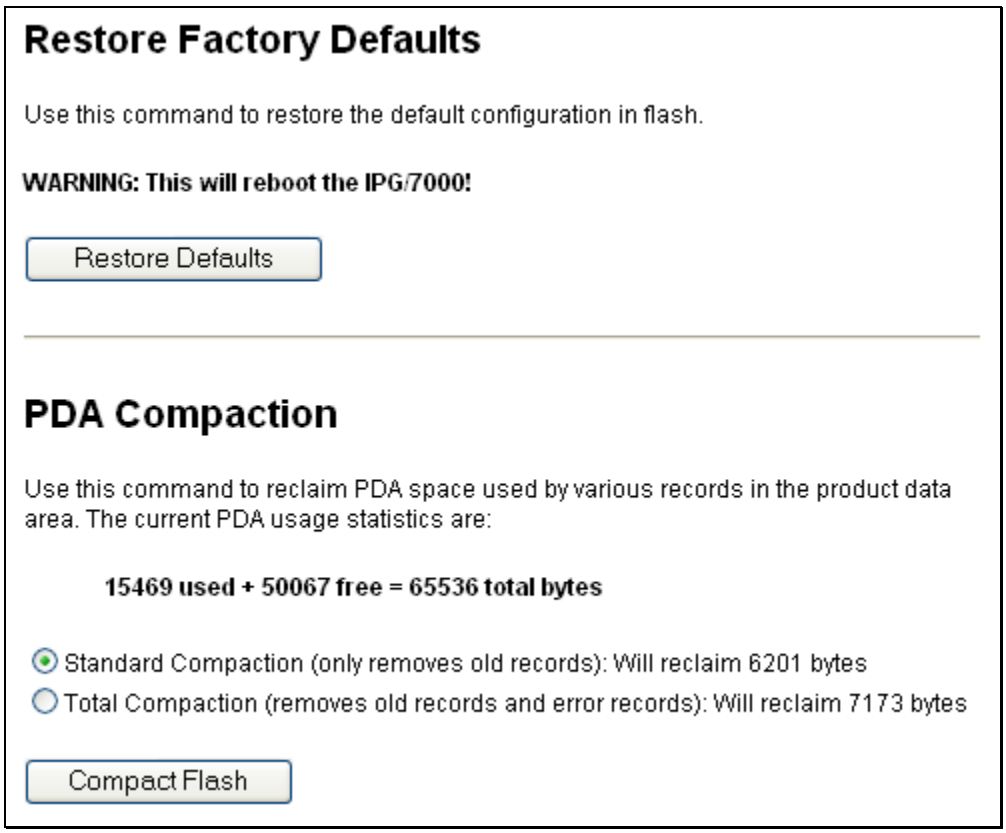
Note: you may only download an OS image that will fit in the flash memory. Units with 1MB flash will not accept images that require the 2MB flash. The "Firmware flash space" value on this page indicates the largest OS image that will fit in this unit.

Download Flash Information

You can use the links in this section to download information about the gateway to BDNL or text files on your system. Right-click on one of the links and save the link to a file:

- **Configuration Database:** Contains configuration information (text or BDNL)
- **Product Data Area:** Contains product information and error history log (BDNL-only)

Once saved to the host, the configuration BDNL file can be restored to a gateway using the **Flash Update** method above.


Restore Factory Defaults
Use this command to restore the default configuration in flash.
WARNING: This will reboot the IPG/7000!
Restore Defaults
PDA Compaction
Use this command to reclaim PDA space used by various records in the product data area. The current PDA usage statistics are:
15469 used + 50067 free = 65536 total bytes
Standard Compaction (only removes old records): Will reclaim 6201 bytes
Total Compaction (removes old records and error records): Will reclaim 7173 bytes
Compact Flash

Restore Factory Defaults

Clicking the **Restore Defaults** button will set the configuration back to the factory default values. You can also restore the gateway's factory default configuration by pressing and holding the "Reset" button for a little over 5 seconds. The gateway will initially blink the status LED red and yellow to notify you that the configuration is about to be restored. After it changes to blinking green and yellow, release the "Reset" button. The factory default configuration is restored and the unit reboots. Either method will reboot the gateway.

PDA Compaction

The gateway stores factory configuration information, boot time information, and error records in the **Product Data Area** (or **PDA**). This information is stored in flash memory and can fill up over time. You can use the **Compact Flash** command to reclaim Product Data Area space. There are two types of compaction operations:

- **Standard Compaction**: only removes old records
- **Total Compaction**: removes old records and error records

Each Compaction method will list the number of bytes that can be reclaimed by selecting that method. In general, you should never need to do this unless directed to by Systech support. The flash used by the PDA is independent of the rest of system memory, and has no effect on system performance or resources.

If you select **Total Compaction**, you should save the PDA to a host file before compacting. The error records may be useful to Systech support personnel for debugging hardware and software problems on your gateway. Select the type of compaction you would like and press the **Compact Flash** button.

Other Debugging

Refer to the hardware manual for a description of the LED activity during operation of the gateway.

If you are using RTN on the host system, you can also use the debugging tools in that product with the gateway.

Chapter 4: Modem Emulation

The gateway can be configured to allow legacy devices that interact with a Hayes compatible modem to function over a TCP/IP network. When modem emulation is enabled on a serial port, the gateway will respond to AT commands generated by the attached device. After receiving the dial command, the gateway will make a TCP connection to the specified host. The gateway will also accept incoming TCP/IP connections and generate the appropriate response codes. As with incoming TCP connections, each Systech serial port accepts incoming TCP connections on two TCP ports: an 8000-series port (for raw or SSL data), and a 9000-series port (for telnet data).

Modes

A port with modem emulation enabled can be in one of two modes: **command** or **data**. The port starts out in **command** mode. In **command** mode, the port is only interacting with the host/device connected to the serial port. It accepts AT style command interaction and responds appropriately. Successfully making an outgoing connection, ("dialing" with the ATD command) or accepting an incoming connection ("answering" with the ATA command) switches the port to **data** mode. In **data** mode, characters received on the serial port are transmitted to the TCP connection and vice versa.

Escape Sequence

When in **data** mode, the gateway looks for an incoming escape sequence on the serial port. The escape sequence consists of a pause, three break characters ('+'), and a final pause. Upon receiving this sequence, the port switches to **command** mode. The default pause is one second but can be changed in the S12 register. The escape character ("+")is not programmable.

Types of TCP/IP connections

TCP/IP connections may be in raw TCP mode (with or without SSL security), telnet or telnet binary mode. These are the same settings available for the Incoming/Outgoing network connection services on the gateway. In raw mode, TCP data is passed to/from the TCP/IP connection without any modification. In telnet and telnet binary mode, data coming in the TCP/IP connection is scanned for telnet sequences that are handled appropriately. In telnet binary mode, outgoing TCP/IP connections attempt to negotiate telnet binary mode. Telnet and telnet binary connections may negotiate RFC 2217 mode.

Outgoing and Incoming Calls

After automatically accepting an incoming connection, the gateway will begin generating "RING" response codes to the device at 6-second intervals. Incoming network data is buffered until the device completes the connection by entering **data** mode. The device may enter **data** mode either manually by issuing the "ATA" command, or automatically after receiving the number of rings specified in register **S0**. If the gateway is configured such that DCD will follow the connection status (AT&C1), DCD will remain low until the connection is completed. If not (AT&C0), DCD will remain asserted at all times.

Outgoing calls are made by the ATD command. This initiates an attempt to make a connection to the specified IP:port pair (see Phone Numbers below). A successful connection will send the "CONNECT" result code out the serial port and enter **data** mode. However, if the dialstring was suffixed with a ';', the modem will return to command mode after establishing a connection. If the connection fails for any reason, the "NO CARRIER" result code is returned.

AT Commands

All AT command strings, with the exception of the break sequence ("+++") and the repeat command ("A/"), must be terminated with the command line termination character, defined in S3 (default is CR). All characters before 'AT' are ignored. Unsupported commands are ignored and generate an "OK" result code. Multiple commands may be combined on a single line, however the AT command string is currently limited to 40 characters.

Example:

```
AT&FE0V0
```

Supported Commands

Command	Function	Result
/	Repeat last command	Varies Note: command executes upon "/" character. CR not needed.
<blank>	Attention	OK(0)
A	Answer	OK(0), NO CARRIER(3)
D	Dial	CONNECT(1), NO CARRIER(3) If suffixed with ";" character, will return to command mode upon connection.
En	Echo Mode 0=Turn command echo off 1=Turn command echo on (default)	OK(0)
Hn	Hangup Terminate connection. Optional argument has no function	OK(0)
In	Information 0=Serial Port Speed 3= Model and Version	33600 (Note: Actual value equals current port speed)
O	Return to data mode from command mode	
Qn	Result Codes 0=Enable result codes (default) 1=Supress result codes	OK(0) <blank>
Sn=mm Sn?	Set register to specified value (see below) Return current value formatted as 3 digit decimal	OK(0)
Vn	Result Code Format 0=Numerical result codes 1=Verbose result codes (default)	0 OK
Xn	Result Code Format 0="CONNECT" upon entering online data state 1-4="CONNECT <text>" upon entering online data state	OK(0)
Zn	Load factory default settings and drop current connection. This command also restores the flash configuration for the port back to factory default.	OK(0)

&Cn	DCD Control 0=DCD always on 1=DCD follows connection status (default)	OK(0)
&Dn	DTR Control 0=ignore 1=loss of DTR switches to command mode and leaves connection open 2=loss of DTR switches to command mode and closes connection (default)	OK(0)
&F &Fn	Load factory default settings Equivalent to ATZ without dropping the connection. This command does not affect the flash configuration for the port.	OK(0)
&V &V0	Display S-register values	Ex: E0 Q1 V0 &C1 &D2 S00:002 S02:043 S03:013 S04:010 S05:008
&V1	Status	Returns reason for the last disconnect: TERMINATION REASON.....DTR LOSS TERMINATION REASON….CARRIER LOSS
&W &Wn	Write current configuration to flash	OK(0)
&Xnnn	Change baud rate. Nnn Baud 3 300 12 1,200 24 2,400 48 4,800 96 9,600 14 14,400 19 19,200 28 28,800 38 38,400 57 57,600 115 115,200	OK(0)
&x	Any other & command is ignored	OK(0)
%x	Any % command is ignored	OK(0)
+x	Any + command is ignored	OK(0)
$xn	Any $ command is ignored including 0 or more digits after the command.	OK(0)

S-Registers

S Registers are 1 byte, volatile registers used to store configuration data. They are reset to the default state whenever modem emulation is enabled, or the ATZ/AT&F command is received. They can be saved to flash memory with the AT&W command. When the port is opened, the saved parameters are applied to the port.

Supported S-registers

Register	Contents	Default
S0	Automatic Answer(# of RING's)	0(disabled)
S1	Number of RING's Received	0
S3	Command Line Termination Character	CR(13)
S4	Response Formatting Character	LF(10)
S5	Command Line Editing Character	BS(08)
S12	Guard time on either side of the +++ sequence to break into command mode. Specified in 50ths of a second.	50

Response Codes

Result Code (ATV1)	Numeric (ATV0)	Reason
OK	0	Command Successful
CONNECT	1	Connection Established
RING	2	Incoming connection awaiting answer
NO CARRIER	3	Connection Terminated
ERROR	4	Error in AT command string
CONNECT 1200	5	Connected – Serial Port Speed is 1200 baud
NO DIALTONE	6	Not Used
BUSY	7	Not Used
NO ANSWER	8	Not Used
CONNECT 2400	10	Connected – Serial Port Speed is 2400 baud
CONNECT 4800	11	Connected – Serial Port Speed is 4800 baud
CONNECT 9600	12	Connected – Serial Port Speed is 9600 baud
CONNECT 14400	13	Connected – Serial Port Speed is 14400 baud
CONNECT 19200	14	Connected – Serial Port Speed is 19200 baud
CONNECT 28800	15	Connected – Serial Port Speed is 28800

CONNECT 38400	28	Connected – Serial Port Speed is 38400 baud
CONNECT 57600	18	Connected – Serial Port Speed is 57600 baud
CONNECT 115200	31	Connected – Serial Port Speed is 115200 baud
CONNECT 230400	65	Connected – Serial Port Speed is 230400 baud

Modem Signal Behavior

The gateway serial ports should be set to DCE mode when modem emulation is enabled. A DCE port is designed to be connected to a DTE device via a straight-through cable. Refer to the gateway hardware manual for specific pinout information for your unit.

To emulate a modem properly, the gateway does the following:

Mode	Modem DCD Settings	Behavior
Command/Data	Always on (&C0)	DCD is asserted
	Follow connection (&C1)	DCD is asserted only when TCP/IP connection is present and has been accepted via ATA or auto-answer. DCD is de-asserted when connection is lost

The gateway monitors the device's DTR signal. The following behaviors occur on loss of DTR only.

Mode	Modem DTR Settings	Response to loss of DTR
Offline	AT&D0	Ignore
	AT&D1	Ignore
	AT&D2	Ignore
Online	AT&D0	Ignore
	AT&D1	Drop to command mode, preserving connection
	AT&D2	Drop to command mode, terminating any connection

Phone Numbers

The "phone number" used in an outgoing connection for an "ATD" command may be a real phone number that is translated to an IP/port pair (see **Phone Number Translation**) or it consists of an IP address and port number. All leading non-numeric characters (such as the T or P dial modifiers) are ignored. A number of formats are accepted for the "IP" phone number.

Format	Example	Notes
Dotted decimal	a.b.c.d 192.168.1.1	Numbers are from 0 to 255
Comma decimal	a,b,c,d 192,168,1,1	For programs that don't allow dots in phone numbers
Fixed format	aaabbbcccddd 192168001001	12 digit IP address, each number is three decimal digits with leading zeroes
Port number	:xxxxx	Decimal TCP port number from 0..65535

- The source port for the TCP connection follows the Source TCP Port configured for the port.

Port Settings

Serial ports used for modem emulation should be set to DCE mode. Most of the other serial port settings (like baud rate) are controlled by the configured port settings on the gateway. Modem emulation does not support changing these from AT commands.

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```

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